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Computer-Mediated Communications for Distance Education and Training: Literature Review and International Resources

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This report offers Army instructors and instructional designers a practical review of research findings on the successful implementation of computer-mediated communications (CMC) for distance education and a reference guide to international resources useful to both researchers and practitioners. The report summarizes and integrates material drawn from a wide range of international resources, including distance education journals, internal reports, conference papers, ERIC documents, and books and journals pertaining to education, psychology, technology, computers, and communication.

Part 1 of the report, the literature review, provides instructors and instructional designers with practical knowledge regarding the design and implementation of distance training with CMC, including relevant knowledge about specific needs of distance students. Example topics include frequency of feedback; effective design and implementation of group activities; shifts in instructor role for a distance environment; characteristics of

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successful distance students and instructors; and recommendations for pacing of students and instructors.

Part 2 contains various resources and overviews, including a selected list of international distance teaching institutions; a discussion of distance and graduate study; annotation and charts on educational and communication applications of CMC; an overview of conferencing software including addresses for the vendors; an international list of distance education; and a selected bibliography of references in distance education, CMC, information technology, media selection, and adult education.

Research Product 91-06

Computer-Mediated Communications for Distance Education and Training: Literature Review and International Resources

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Training and Simulation

FOREWORD

Limited time and wide geographical dispersion of both units and individuals in the National Guard and Army Reserve, i.e., the Reserve Component (RC) make it difficult and costly for soldiers to travel to branch schools for training. Therefore, the RC is exploring alternatives that will use technology to bring training and educational opportunities to the soldiers' homes. One of these alternatives is the creation of remotely conducted classes in which individuals are linked with each other and their instructors using computer-mediated communications.

This report reviews the literature on using computer-mediated communications to conduct training and education at a distance and provides listings of resources on institutions/organizations conducting distance computer-mediated education and training as well as journals and software. The report was developed by the U.S. Army Research Institute Boise office within the charter of the Training Technology Field Activity-Gowen Field (TTFA-GF), whose mission is to improve Reserve Component Training effectiveness and efficiency through the testing and application of technology. The research task supporting this mission is entitled "Application of Technology to Meet Reserve Component Needs" and is organized under the "Training for Combat Effectiveness" program area. The National Guard Bureau and Headquarters, Training and Doctrine Command (TRADOC HQ) sponsored this project under the Memorandum of Understanding signed 12 June 1985 that established the TTFA-GF. Project results have been briefed to TRADOC HQ, Office of the Chief, Army Reserve, and the National Guard Bureau.

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COMPUTER-MEDIATED COMMUNICATIONS FOR DISTANCE EDUCATION AND TRAINING: LITERATURE REVIEW AND INTERNATIONAL RESOURCES

CONTENTS

CONTENTS (Continued)

Page

LIST OF FIGURES

COMPUTER-MEDIATED COMMUNICATIONS FOR DISTANCE EDUCATION AND TRAINING: LITERATURE REVIEW AND INTERNATIONAL RESOURCES

PART ONE: LITERATURE REVIEW

Statement of Purpose

The purpose of this product is to provide individuals and institutions with an integrated body of international resources and literature regarding the use of computer-mediated communication (CMC) in distance education. However, because of the comparative recency of educational applications of CMC, there are many gaps in the literature as well as areas where published information is not extensive. For these reasons, material on CMC is presented within the larger context of distance education, thus providing a review of some of the major findings in that area as well. The rationale is that the factors involved in successful implementations of distance education will also apply to implementations of CMC for distance study.

It is anticipated that the recommendations based on the literature will be applied to a remotely delivered, technology-based, distributed training system for the Reserve Component. These recommendations should easily generalize to a range of Army training tasks since they were derived from a wide variety of implementations of distance education and CMC, both academic and industrial, throughout the world.

Overview

Distance education is a worldwide phenomenon. Remote delivery of education and training responds to various demographic, technological, and academic factors. Demographic factors include: the high percentage of adults in industrialized and third world countries (60-70% and 50-60%, respectively) (Pentz and Neil, 1981); adult illiteracy, especially in third world countries (Pentz and Neil, 1981) ; the changing socioeconomic status of women (Northcott, 1986); and the number of adults living in rural or non-urban areas (Australia, for example), particularly when rugged climatic conditions prevail (i.e., Norway and Sweden).

While distance study may be the most viable educational option in these demographic conditions, it would be a mistake to assume that appropriate implementations are limited to these contexts. Distance courses may be the first choice by students who have the option of traditional resident instruction. For example, research on correspondence students frequently shows a higher percentage living in urban than rural areas (Bååth, 1980); the convenience and flexibility of distance education often makes it an attractive option to busy adults who reside in the same city as the school (Radford, 1982).

Various techological and academic factors have also contributed to the proliferation of distance offerings by institutions throughout the world. (See Part Two for a selected list of distance teaching institutions.) For example, both industrial and third world nations face urgent demands to continually upgrade existing technologies in order to accommodate rapid change (Northcott, 1986; Pentz and Neil, 1981). The case of

Soviet Armenia is illustrative. Armenia has chosen to incorporate CMC into its new infrastructure, suggesting that at least some of the efforts to recover from the earthquake focus not just on rebuilding the old, but on modernizing, even accelerating growth (P. Levinson, personal communication, Nov. 11, 1989).

The rapid pace of technological developments is complemented by the fact that distance education has become a viable means for many institutions to maintain enrollments at a desirable level, a critical concern when enrollments by traditional college-age students (18-22 years) are declining (Northcott, 1986). Further, the appeal of distance study is enhanced by its increasing academic respectability, due in large measure to the ground-breaking efforts of the British Open University (Northcott, 1986). Its high quality instructional materials and tutor support system have helped establish the comparability of quality distance to quality face-to-face study. In fact, at some bi-modal institutions (universities with both face-to-face and distance study), materials developed for distance study are often used in residence because of their superior quality (Granger, 1988; Kaye, 1981a).

Distance Education Defined

For the purposes of this review, Rumble's (1989) five part definition of distance education is adopted. Distance education implies:

1. The existence of a teacher, students and at least an implicit contract between them.
2. The physical separation of teacher and students.
3. The physical separation of learners from the institution sponsoring instruction.
4. Two-way communication between an instructor and student or groups of students.
5. That any course materials provided to students are designed specifically for distance study.

(For further information on alternative definitions and the theoretical and pragmatic concerns involved in their formulations, see Barker, Frisbie, and Patrick, 1989; Garrison and Shale, 1987; Keegan, 1980; Thompson, 1986).

CMC Defined

CMC is a means to establish an electronic classroom that is accessible to participants who may otherwise be separated by time zones and physical distance. Students and an instructor use their personal computers and modems to connect with a central host computer that is running a conferencing program. (For more information on conferencing software, see Part Two.) Students have 24 hour access to the host computer, and can dial it up to receive or leave messages for other participants. More than one person can be logged on at the same time (synchronous interaction) but typically the communication is asynchronous. A student can

either communicate individually with another student or the instructor, or participate in group projects. In short, CMC is a way to provide distance students with classroom experiences that are comparable to residence training. For more information, see Davie, 1987, 1988, 1989; Harasim, 1987, 1990; Hiltz, 1986; Mason and Kaye, 1989.

Additional information is provided in Part Two of this document. The first category of information concerns educational and industrial implementations of CMC around the world. Other resources include overviews of the capabilities of various conferencing software as well as addresses of the vendors. A third group of resources provides reference information on international clearinghouses for distance education, a selected bibliography of distance education and CMC, and an international list of distance education journals.

State of the Literature

This report is not an exhaustive review of the literature on CMC for distance education. There are two reasons for this. First, both areas are so volatile that developments outstrip the the rate of journal publication. Second, the literature is as distributed as the implementations. Even the journals devoted exclusively to distance education are rarely available en masse in a single locale.[1] In addition to journals, information is available in unpublished papers, internal reports, and conference papers, as well as in books and journals pertaining to education, psychology, technology, computers, and communication, to name only a few. Valuable information may also be found in foreign publications with limited circulation in the United States. As a result of these factors, omissions on the selected review topics are inevitable, although hopefully minor in scale.

In addition to the distributed nature of the literature, a few words are necessary on the material itself. Readers accustomed to rigorous experimental studies will be disappointed for these are a rarity in studies of CMC and distance education. Indeed, various endeavors in distance education seem to be inspired by an "everyday rationality and . . . embryonic conceptualization of distance learning" (Marland and Store, 1982, p. 72) as well as "[H]unch and humanity" (Jenkins, 1981, p. 168). In fact, most of the literature on distance education consists of either case studies or conclusions/recommendations that may or may not be accompanied by empirical evidence.

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[1]The primary distance education journals published in English are Distance Education (Australian), the Journal of Distance Education (Canadian), the American Journal of Distance Education, Open Learning (English; formerly Teaching at a Distance). See Part Two for a selected bibliography of distance education and CMC, addresses for international clearinghouses of distance education, and an international list of journals.

There are many reasons for the primarily descriptive nature of the literature. First, many institutions lack the resources for ongoing evaluation of distance courses. Studies may be conducted only in response to problems that have arisen, if then. Second, educational implementations of CMC are a fairly recent development. In fact, the first use of CMC for teaching may have occurred in the fall of 1982 on The Source's PARTICIPATE system (Paulsen, 1987).

Second, educational applications have thus far been confined primarily to selected classes within institutions' course offerings, and then, typically at the initiative of individual professors who have even more limited resources for evaluation.[2] There are occasional exceptions, however, such as the Army Research Institute's (ARI) and the Open University's CMC courses which were designated by their respective institutions as test cases for evaluation of educational applications of CMC. (For a thorough discussion of the design and implementation of ARI's course, see Hahn, Ashworth, Phelps, Wells, Richards, and Daveline, in press; Hahn, Harbour, Wells, Schurman, and Daveline, in press). (For a discussion of the implementation and evaluation of the Open University's course, see Mason, 1989; 1990; Heap, 1990).

Other reasons for the primarily descriptive nature of the literature can be traced to the environment of the distant student. The autonomy and flexibilty that are so valued by distance students can be a bane to researchers. Further, attempts to conduct research only impose additional demands on students' already limited time and resources.

Issues in Distance Education

Dropout and performance are perhaps the primary concerns in both distance and resident education. In distance education courses for adults, dropout rates of 50% or more are not unusual when non-starters are included in the calculations (Bååth, 1982). Indeed, non-starters sometimes outnumber the "real" dropouts in a distance course (Bååth, 1984). (A non-starter is a student who registers for the class but never submits an assignment.)[3]

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[2]There are a few institutions where CMC is more pervasive, constituting a primary delivery medium. Some of these institutions include the NKI College of Computer Science (Norway), The New Jersey Institute of Technology, Nova University, and Connected Education (all U.S.). For more information, see the section in Part Two on Educational Aplications.

[3] A basic issue when evaluating an institution's dropout rate is whether non-starters are included in the final calculation of dropout. Since this category is normally substantial in size, most universities report figures for both nonstarters as well as actual dropouts, i.e people who had contact with a tutor or instructor, submitted the first assignment and then dropped out.)

One major difference between training and education is that dropout is virtually a non-issue in training because people are not allowed to drop out. For example, in Army residence training, the dropout rate is 5% or less, while dropout in correspondence education is typically 65%.

Few figures are available for dropout in CMC courses. However, Hiltz (1986) suggests that even if students have self-selected, dropout rates of 20% or more can be expected. In the ARI CMC course, dropout was 36%. However, this figure is probably at the high end of what can be expected, due to formative issues that would not arise in a fully developed implementation (Hahn, Ashworth, et al., in press).

It is unusual to find research in which an institution compares performance data in a distance education course with a comparable equivalent taught on campus. At least three reasons can explain the lack of research in this area. First, many distance education courses cannot be compared to traditional courses, precisely because they are not equivalent. Many distance education courses are designed, course materials written, and instructors trained for success in a remote learning environment. Indeed, it may be inappropriate and perhaps incorrect to assume that face-to-face is the sine qua non for effective communication. Instead, "each medium has its own inherent characteristics which should not be expected to mimic face-to-face patterns" (Vallee, Johansen, Randolph, and Hastings, 1974, p. 4). Effective instructional design and delivery should select the media most appropriate for the training task and exploit the special capabilities of the technology.

Second, comparisons with traditional offerings are virtually irrelevant if a distance education course is the only way in which a student can participate. In this event, the main issue becomes one of course evaluation to improve the offering. Third, distance education is not a heavily researched area.

Organization of the Review

This literature review discusses dropout and performance within the framework of instructor and instructional design considerations. These two divisions begin with a list of summary statements. These are followed by a brief consideration of student variables, since student characteristics will impact both designers and instructors. The sections on instructor[4] and instructional design are organized in a question/answer format in order to maintain a focus on practical issues of implementation.

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[4]There are two basic types of instructors in distance education, the first being similar to a residence counterpart. However, in some of the larger distance universities, the instructor's responsibilities are assumed by tutors, who work with materials prepared by a team of content experts and instructional designers.

Summary of Student Factors Relevant to an Instructor

* Female students are less likely to drop out than male students.

* A higher level of educational attainment is positively correlated with course completion.

* Older students (in their middle or late twenties) are less likely to drop out than younger students.

* While geographic dispersion can motivate people to use CMC, user acceptance can be high any time people need to communicate.

* Limited research on personality characteristics and CMC shows that some characteristics are related to successful performance.

* Successful performance in CMC typically requires some changes in an individual's communication patterns.

The Role and Responsibilities of a Distance Teacher

* Research suggests that an instructor should shift from an authoritarian to a more facilitative role, both in CMC and distance classes.

* The most critical factor in instructor-student interactions may be a friendly personalized relationship. Contact with an instructor can favorably impact both completion rates and performance.

* CMC's capacity to support group work at a distance is one of its most valuable features.

Student Variables Relevant to an Instructor

Gender

IS THERE ANY RELATIONSHIP BETWEEN GENDER AND DROPOUT IN DISTANCE STUDY?

Studies of dropout which include sex as a variable indicate that males are more likely to drop out than females (Bååth, 1980; Lamy and Henry, 1983) even when studying the same courses (Donehower, 1968; Lockwood, 1973; Reedy, 1971). In its ten year self-study, the Open University found this trend to hold for both new and continuing students (Woodley and Parlett, 1983).

Likewise, Chicago TV College found that males were less likely to complete courses than their female counterparts (Duby and Giltrow, 1978).

Education

IS A STUDENT'S EDUCATIONAL LEVEL RELATED TO DROPOUT?

One of the most robust findings in the literature on distance education is that completion is positively correlated with level of education (Lamy and Henry, 1983; Rekkedal, 1983; Woodley and Parlett, 1983). For example, a ten year study by the Open University of its students showed a persistent inverse relationship between dropout and educational level (Woodley and Parlett, 1983). This trend was true for both new and continuing students, but was more marked for new students. For example, in 1981, new students with no formal qualifications had a dropout rate of 48%, while new students with a university degree had a rate of 13%. For these same categories, the figures for continuing students ranged from 46% dropout to 32%.

A student's educational history can be an even more accurate predictor of dropout if it includes prior correspondence study. Typically, completion of a prior correspondence course is one of the most accurate predictors of dropout in a succeeding course (Greenberg, 1981; Rekkedal, 1983).

Age

IS AGE RELATED TO DROPOUT RATES?

In general, older students are less likely than younger ones to dropout. Rekkedal (1983) found a positive correlation between age and completion, where "old" was defined as twenty-seven or over. Likewise, Lamy and Henry (1983) found a decline in dropout with older students (twenty-four and over).

However, most of the literature relating age to completion is difficult to evaluate for two reasons. First, the term is rarely operationally defined and second, its interaction with other factors often goes unacknowledged. For example, some information suggests that dropout is lower for older than younger students. Other information suggests that dropout is higher for older than younger students because of lack of confidence in their academic abilities, disuse of study skills, and time-consuming commitments to family and job.

It is important to distinguish between: a) older students for whom learning (either within or outside an institution) is a lifelong commitment and who are thus highly motivated and academically prepared, and b) students who are returning to school after the lapse of many years (who lack confidence, study skills, and knowledge about how to restructure their schedule to accommodate the new demands of a distance course). In this

respect, Rekkedal (1983) notes that if variables such as level of education, work experience, and age are not controlled, it can appear that successful students are those who are returning to school after a lengthy absence. However, in general, it is these students who suffer a disadvantage (Rekkedal, 1983).

This distinction between categories of older students could be important for screening students upon entry or selection, with implications for advising and training in study skills and time management.

Geographic Dispersion

WHAT IMPACT DOES GEOGRAPHIC DISPERSION HAVE ON INTERACTION IN A CMC COURSE?

While geographic dispersion has rarely been considered a variable in studies of educational applications of CMC, there is some information on its impact on user acceptance of CMC for strictly communication purposes. Kerr and Hiltz (1982) suggest that rates of use and user satisfaction will be positively correlated with the geographic dispersion of the participants. However, it is important to note that user acceptance of CMC can also be high among people who are in the same general location, because urban participants for example, may have difficulty synchronizing schedules for meetings or telephone contact (Kerr and Hiltz, 1982; Turoff, 1990).

By its very nature, the Reserve Component is characterized by geographic dispersion. Units are located at 4,000 Armories and Reserve Centers throughout the U.S., which results in large number of Military Occupational Specialties (MOSs) which have low density participation. In addition, training time is distributed over 12 weekends and one 15 day annual training session. The distributed nature of the Reserve Component population and training schedule should favorably impact user acceptance of remote delivery of training via CMC.

Personality

ARE CERTAIN PERSONALITY CHARACTERISTICS RELATED TO SUCCESSFUL PERFORMANCE AND USER ACCEPTANCE IN CMC?

Little research has examined the relationship between personality factors and performance in computer-mediated instruction, but available material suggests that the following personality variables may be positively correlated with acceptance of the technology: assertiveness, internal locus of control, high tolerance for ambiguity, extraversion, and risk-taking (Kerr, 1987; Kerr and Hiltz, 1982).

While there do appear to be some personality variables that correlate with acceptance of CMC, this information would have to be translated into operational form (i.e. a scale) before its

usefulness could be realized. It is also likely that other factors like motivation could override the effects of personality variables.

WHAT KINDS OF ADJUSTMENTS DO STUDENTS HAVE TO MAKE TO SUCCEED IN A CMC CLASS?

Computer conferencing involves many, sometimes radical changes in communication patterns (Hiltz and Turoff, 1978). Instead of the countless verbal and nonverbal cues available in face-to-face encounters, CMC offers the visual contents of a computer screen. User acceptance of CMC requires "changes in the most basic habits embedded in one's daily activities: how one thinks, composes materials, and communicates..." (Kerr and Hiltz, 1982, p. 62). All new users appear to experience some form of culture shock which gradually dissipates with practice (Hiltz and Turoff, 1978).

Most of the research has thus far concentrated on the effects of CMC on communication and decision-making processes. While the medium makes fast and flexible exchanges possible, typing and reading are probably more difficult or time-consuming for participants than face-to-face verbal exchanges (Siegel, Dubrovsky, Kiesler, and McGuire, 1986). As a result, the speed of transmission and the lack of nonverbal cues (expressing feelings, comprehension etc) create the potential for inefficient "multiple monologues" instead of efficient communication (Siegel et al., 1986, p. 160).

Because of the range of adaptations required by the medium, it would be advisable to offer new users some form of orientation to CMC, including suggestions designed to facilitate a quick efficient start as well as techniques for expressing nonverbal cues in the medium. (See Hiltz and Turoff, 1978 and Harbour, Daveline, Wells, Schurman, and Hahn, in press for specific recommendations.)

The Role and Responsibilities of a Distance Instructor

Instructor Responsibilities

HOW DOES THE ROLE OF A DISTANCE TEACHER COMPARE WITH A FACE-TO-FACE INSTRUCTOR?

The role of the instructor in distance education varies across courses and media, but the importance of the role is frequently ignored, even by researchers (Bååth, 1982). Many institutions still adhere to the "primitive notion" of an instructor whose primary function is to correct assignments and assess student achievement (Holmberg, 1981, p. 88).

The role of an instructor in a distance learning environment is considerably more diverse than a teacher in a traditional setting (Coldeway, 1982). An instructor in distance education

should be concerned with academic and vocational counseling, follow-up on students' progress, feedback on performance, guidance regarding study skills, quality control of learning materials, interaction with other tutors, and coordination between institution and students (Meija, 1984, cited in Chacon-Duque, 1985).

IS PERSONALIZED CONTACT WITH AN INSTRUCTOR A CRITICAL COMPONENT IN A DISTANCE COURSE?

One of the most important aspects of instructor-student interaction by whatever medium is personalized contact. For example, the percentage of students completing a correspondence course doubled when a warm personable instructor replaced a "cold, subject-oriented man" (Stein, 1960, p. 166). Similarly, survey results from Project REDEAL at Canada's Athabasca University indicated students valued the "human element" in their contact with a tutor (Coldeway, MacRury, and Spencer, 1980, p. 19).

Students value personal responsive attention, which is facilitated by the CMC environment. One instructor who taught a CMC course for the Rochester Institute of Technology noted that it was easier to feel personal involvement with students in a CMC compared to a face-to-face class because the conferencing software always identified students by name; hence, "it was easier to remember who they were and develop some sense of personal relationship" (Bissell, Coombs, Medvedeff, and Rogers, 1987, p. 7).

WHAT ARE SOME EXAMPLES OF INDIVIDUAL INSTRUCTOR-STUDENT INTERACTIONS IN A DISTANCE ENVIRONMENT? WHAT KIND OF IMPACT DID THE INTERACTIONS HAVE ON DROPOUT AND PERFORMANCE?

Course completion is facilitated by contact with an instructor. For example, a survey by Denmark's Jutland Open University revealed that 80% of students who had contact with their tutor once a month or as needed, completed their study; in contrast, the completion rate for students with no tutor contact was only 50% (Hald, 1987, cited in Lorentsen, Dirckinck-Holmfeld, and Christensen, 1989).

In some cases, the model of instructor-student interaction is the opposite of face-to-face: instead of students traveling to a central location to meet with an instructor, the instructor travels to the students. For example, in one Canadian province, 3500 people were completing their secondary education using printed materials and television broadcasts. An instructor visited all students on a regular basis. The dropout rate during this extended course of study was a low 15% (Jenkins, 1981).

An Open University survey found that retention was facilitated when the instructor called all students once a week (Woodley and Parlett, 1983). Further, one of the most effective means to facilitate throughput is for the instructor to contact

the student as soon as possible after enrollment (Bååth, 1980; 1982). On the other hand, student-initiated calls are also effective. In Athabasca University's Project REDEAL, students who completed the work made five times as many calls to their tutor as non-completers (Coldeway, 1980).

These results suggest that student contact with a tutor facilitates completion, regardless of who initiates the interaction. Contact with a tutor can also impact performance by reducing the lags or fluctuation in work and helping maintain student motivation at a more constant level. In one study, researchers found that while motivation dropped as the course progressed, it increased during exam periods and when students had contact with their tutor (Coldeway, 1980).

CMC provides a very convenient means for students and instructor to remain in close contact, because its asynchronicity accommodates conflicting schedules. Bååth (1980) notes that the face-to-face meetings required by some distance institutions could be replaced or supplemented in many cases by telephone contact "without destroying the students' freedom with regard to time and place" (p. 144). However, CMC represents an even more evolved form of communication; its asynchronicity allows for more constant communication between instructor and students without the demanding constraints synchronous phone conversations place on participants.

But telephone contact also has its place in a CMC classroom. In a pilot study investigating the use of e-mail and facsimile transmission in teaching Australian school children, a phone call was the opportunity for an informal visit with the tutor as well as a chance to resolve problems with the new technology (Vivian, 1986).

The telephone also played an indispensable role in the ARI CMC course. During the 31 week course, students placed 388 calls to the instructor, an average of 30 calls per student. In contrast, students initiated computer contact with the instructor 426 times, an average of 33 comments per student. Roughly 18% of all the calls were made in the first 2 weeks, suggesting the telephone was a vital link to the instructor when computer problems would have impeded access. The ARI CMC Instructor Training Manual provides a thorough treatment of specific cases in a CMC course when the telephone plays a vital role and also includes sample scenarios for various types of interaction (Harbour, et al., in press).

WHAT CHANGES MUST AN INSTRUCTOR MAKE IN ORDER TO SUCCESSFULLY LEAD A DISCUSSION IN A CMC CLASS?

Leading an educational computer conference can require an instructor to change teaching styles to function most effectively (Kaye, 1989; Nipper, 1989; Richards, 1984; Smith, 1988). For example, in CMC, it may be appropriate to pose questions instead

of simply supplying answers, learning when to remain silent, and deflecting an individual's requests for help to the group as a whole (thus encouraging student-to-student communication). Turoff (1990) estimates that 10-20% of faculty will be able to adapt easily because they already use this teaching approach, while another 10-20% will probably never adapt. The remainder will need special training, perhaps as an apprentice (Turoff, 1990) or as an invited observer in another instructor's CMC classroom (Hiltz, Shapiro, Ringsted, 1990).

One major consequence of a shift to more facilitative behavior is that the instructor monopolizes less class time. For example, in a face-to-face class, an instructor may monopolize 60-80% of verbal interaction (Dunkin and Biddle, 1974; McDonald and Elias, 1976), while a CMC instructor may only contribute 10-15% (Harasim, 1987; Winkelmans, 1988).

The typical decline in instructor dominance is accompanied by more student-generated discussion. In an early CMC study, several important differences in instructor and student behaviors were found between the CMC and control (face-to-face) class. First, the teacher in the face-to-face class directed twice as many questions to students as the instructor in the CMC class. Second, a comment by the CMC teacher might be followed by several student responses, compared to the almost 1:1 ratio characteristic of the traditional class. Finally, students in the CMC class evaluated each other's comments with greater frequency than occurred in the face-to-face class (Quinn, Mehan, Levin, and Black, 1983).

Thus, in a CMC class, it might not only be appropriate but <u>necessary</u> for an instructor to <u>delay</u> feedback in order to enable students to respond to the issue and to each other. While this suggestion seems to contradict the importance of immediate feedback, it does highlight some of the complexities in CMC. While prompt feedback may <u>generally</u> increase student motivation and performance, it may subvert a computer conference by reducing it to glorified e-mail; too-frequent input by the instructor may reduce the responsibility students take for developing and preserving a true conference (Smith, 1988).

Kerr and Hiltz (1982) suggest the amount of interaction between instructor and students is a curvilinear one. Up to a point, user acceptance and activity may be facilitated by high instructor responsiveness, while too much activity by the instructor can lead to information overload or resentment on the part of the students.

Furthermore, peer learning can help reduce the risk of instructor burnout (Mason, 1988). For example, Hiltz (1984) simultaneously ran a traditional and conferencing course on the same topic. The conferencing course required twice as much instructor time because students expected the teacher to always be on-call, a sharp contrast to a regular classroom environment.

HOW WILL THE INSTRUCTOR ROLE CHANGE DURING THE COURSE OF A CMC CLASS?

Instructors should be prepared to change their roles and behaviors as the students become more familiar with CMC and distance education in general. Obviously, this is particularly true of the first CMC course taken by students. At the beginning of a course, it is particularly important to send welcoming notes to each student, reinforce every effort at CMC communication, and draw students' attention to the ways their messages relate to those of other students (Davie, 1989).

Strong parallels might exist between the changing behavior of a CMC instructor and a conference facilitator. Some information is available from the Institute for the Future regarding the changing role of a facilitator during a conference designed more for communication purposes (Vallee et al., 1975). As participants became more comfortable with the medium, the facilitator could:

a. become more of a guide and assistant than a teacher

b. make suggestions regarding how to maximize the medium's capabilities in order to achieve the conference goals

c. contact participants to insure that they are able to use the system to fully express their views

WILL INSTRUCTORS IN A DISTANCE/CMC CLASS REQUIRE SPECIAL TRAINING TO OPTIMIZE PERFORMANCE?

Instructors may require special training to function successfully in a distance education setting, particularly if their teaching experience has been acquired in face-to-face interaction. The fact that many distance learning universities provide their instructors with special training is an acknowledgement of the different role requirements for distance teaching.

For example, the NKI in Norway conducts mandatory teacher training for all its correspondence course instructors (Rekkedal, 1982). The results of a R & D program at Canada's Athabasca University indicated its tutors required special training in interpersonal skills, a finding suggestive for CMC instructors as well. This training encouraged instructors in facilitative behavior, including ways to ask open-ended questions (Coldeway, 1980). Instructors were also provided with training in phone interaction, because individuals who are skilled communicators in a face-to-face setting may be less successful in a distance learning environment. Part of the training in telephone skills for any distance teacher should include ways to use the telephone for facilitating individual and group progress instead of merely disseminating information or monitoring assignments (Fales and Burge, 1984).

CMC instructors can benefit from special training in the following areas: interpersonal skills, facilitative skills, media selection, and instructional design for the distance environment.

Interpersonal. Ironically, instructors in a CMC course may find it easier to recognize and respond to individuals than an instructor in a face-to-face course, who is simultaneously confronted by many students (Harasim, 1986). As a result, special training could help instructors maximize the personalized behavior which can distinguish CMC from other forms of distance education.

Facilitative. One of the reasons for conference failure can be lack of strong leadership (Johansen, Vallee, and Spangler, 1979; Kerr and Hiltz, 1982). A clear agenda must be set and efforts made to keep the group working toward the goal. In one case, for example, conference activity became disorganized and response rate dropped sharply when the instructor went on vacation or was unavailable for more than a week at a time (Hiltz, 1981).

In related fashion, researchers at the Institute for the Future concluded that there are at least two types of conference participants (based on analyses of conference transcripts) (Vallee, et al., 1975):

a. Individuals who advance a conference by introducing substantively new or significant material which provokes a response from other members.

b. Participants who facilitate progress by integrating and synthesizing threads, and in the process, returning the conference to its prescribed themes.

In a CMC class, it is likely that the instructor would function in both of these basic roles, stimulating discussion as well as synthesizing themes with the prescribed course goal in mind. Another option would be to have either an individual student or the entire class summarize the results of the week's discussion and integrate the threads.

Media selection. An area of instructor training that is frequently ignored is the need for teachers to be acquainted with the capabilities (including limits) of all the media that can be incorporated in a CMC course, including CAIs, graphics, TV, and so on. A CMC instructor also needs to know when to move from computer communication to telephone or face-to-face contact (Davie and Palmer, 1984).

Instructional design. Instructors must also understand the differences between instructional design for a CMC as opposed to a face-to-face course. Thus, an instructor needs to understand such issues as the pedagogical uses of a synchronous meeting and how to facilitate one (Davie and Palmer, 1984).

One solution adopted by some institutions is to have two instructors for a course. One can assume primary responsibility for course content and discussions, while the other focuses on training students on the software, user support services, and coordinating tasks (Harasim, 1986). For instance, the ARI CMC course involved both part-and full-time personnel for various jobs, i.e. instructor, team leader, capstone moderator, and so on. (For examples of instructor training manuals, see Harbour et al., in press; Staff Development Team, 1988).

Feedback

WHAT FACTORS AFFECT HOW FREQUENTLY AN INSTRUCTOR CAN PROVIDE FEEDBACK IN A DISTANCE CLASS? HOW DOES FREQUENCY OF FEEDBACK AFFECT COMPLETION AND PERFORMANCE?

Frequency of feedback in a distance class can be affected by the class size (which can increase the instructor's grading time) and by the efficiency of the postal service. In general, some evidence suggests that larger class sizes lead to less feedback generated by the instructor, slower turnaround time, and subsequent increases in student attrition (Chacon-Duque, 1985). Institutional efforts to reduce the turnaround time for feedback have typiclly been rewarded with higher completion rates. For example, when Norway's NKI reduced the turnaround time in feedback from a median of 8.3 days to 5.6 days, completion rates rose from 69 to 91% (Rekkedal, 1983).

The issue of frequency of feedback is more complicated in a CMC class. Students new to a CMC environment often expect feedback as immediate as that in face-to-face encounters (Vallee, Johansen, Lipinski, Spangler, and Wilson, 1978). With increased experience in the medium, the need for immediate feedback typically disappears as users begin to appreciate the flexibility of asynchronicity (Hiltz, 1979). However, while students' need for immediate feedback may disappear with experience, there are still sound pedagogical reasons for timely feedback from an instructor. While data are limited, certain case studies suggest that a turnaround time of 24 hours is a reasonable expectation for instructors in a CMC course. For example, 24 hours was an expectation in the CMC courses conducted by the Dutch Open University and ARI (Hahn, Ashworth, et al., in press; van Meurs and Bouhuijs, 1989). In the ARI CMC course, the instructor provided feedback within 24 hours in 80% of the cases. In fact, most of the feedback occurred either within four hours or between 8-16 hours.

The last finding demonstrates the different work schedules of the part-time students (who worked primarily at night) and the full-time instructor (who worked days with evening office hours) (Hahn, Ashworth, et al., in press). A full-time instructor working days can respond to questions asked the previous night and post announcements and notices which will be there when students logon the next evening. In general, a full-time instructor is

likely to provide quick turnaround on a more consistent basis than a part-time teacher (Hahn, Ashworth, et al., in press).

While 24 hours seems to be a reasonable turnaround time for a full-time instructor, there may be occasions in the course when even 24 hours is too slow. Feedback from students in the ARI CMC course indicated this was sometimes the case, particularly when material was "gated", i.e. required feedback from the instructor before the student could proceed. Consequently, students who had planned to work for several hours (and who might have rearranged their schedules so they could do so) found themselves unable to proceed without the instructor's response (Hahn, Ashworth, et al., in press).

In order to facilitate efficient progress through the course, instructors should consider (Hahn, Ashworth, et al., in press):

1. The use of prerequisites and gated material only when necessary.

2. The utilization of self-check exercises whenever possible.

Group Work

HOW COMMON IS INTERACTION BETWEN STUDENTS IN DISTANCE EDUCATION?

Distance education programs differ both in the extent to which students interact with each other as well as the types of technology used to structure the interaction. In most distance education courses, little or no effort is made to structure student interaction (Davie, 1987). If it does occur, it is likely to fall into one of two categories: informal meetings at local study centers (such as those of the Open University or West Germany's FernUniversität) or temporary and limited communication enabled by audio or video teleconferencing.

Formal group work is comparatively rare in distance study, where course materials are often designed to be self-contained. The self-contained nature of most distance materials reflects the premium placed by a university upon learner independence, flexibility of scheduling, and its own limited institutional resources. In addition, many educational technologies are either too costly or inherently limited in their ability to support group work.

WHAT BENEFITS CAN STUDENTS DERIVE FROM INTERACTIONS WITH THEIR PEERS?

Research has shown that group interaction can increase motivation, completion rates, student satisfaction, and, under certain conditions (i.e. number of students in group), even performance (Pentz and Neil, 1981). The authors base this conclusion on working reports of distance education projects in

Canada, Colombia, India, the Ivory Coast, Kenya, Malaysia, Mexico, New Zealand, the Philippines, and Zambia.

Likewise, studies by West Germany's Radio College showed that voluntary face-to-face attendance at local study centers was positively related to completion (Rebel, 1987). Students who attended the centers and interacted with students and tutors were sometimes the most motivated (who utilized every educational resource), but also those with unequal educational background, problems with specific content, and feelings of isolation. Studies showed that students with lower rather than higher academic credentials were more likely to participate in activities at the study center (Rebel, 1987). Thus, while all students may derive benefits from interactions with a teacher and their peers, it may be of particular importance for students who begin with a lower state of preparedness.

It is important to emphase that feelings of isolation are often a hazard to students working at a distance. Indeed, students may feel isolated not only from other students but also from the educational institution, with whom they may feel only a weak sense of affiliation (Richards, 1984). In this respect, some researchers have likened the dropout in correspondence education to a "suicide" in Durkheim's theory of that phenomenon (Malley, Brown, and Williams, 1976). From this perspective, distance students experience only a weak sense of affiliation with the school, and are thus high risk "would-be suicides" (dropouts). Contact with the instructor and other students can be the most effective way to strengthen ties with the institution and its course of study (Lorentsen, Dirckinck-Holmfeld, and Christensen, 1989; Malley et al., 1976; Mason, 1990). These contacts can not only increase throughput, but also facilitate students' rate of study (Bååth, 1980).

IN WHAT WAYS IS GROUP WORK AN IMPORTANT COMPONENT OF CMC CLASSES?

Many CMC educators consider group work to be the most important factor to consider in course development. "The group nature of computer conferencing may be the most fundamental or critical component underpinning theory-building, designing or implementing online educational activities" (Harasim, 1989, p. 1). In order to fully exploit the capabilities of the medium, CMC should not be used merely as an electronic replica of the typical distance course; CMC is "par excellence about interaction" (Kaye, 1987, p. 26).

CMC can provide students with opportunities to come together for both course-related dialog and informal social exchange. Indeed because of the convenience of working asynchronously, CMC is probably the only technology to maximize flexibility in group work while preserving and even expanding the diversity of interactions characteristic of face-to-face. Freedom from the constraints of a synchronous meeting in a single setting means

that group work is often not only more flexible but that group membership can be more diverse than most face-to-face groups.

CMC "offers possibilities for learning collaborations and networking that have hitherto been impossible to facilitate or to contemplate" (Harasim, 1987, p. 171). For example, CMC is being used by professionals in third world countries to help them remain in contact with developments in industrialized countries (for instance, see White and McD.Dow, 1990). International CMC nets allow not only informal communication but structured projects between high school and university students from the U.S., Israel, Japan, and Mexico (For further information, see Cohen and Miyake, 1986; Riel, 1985, 1988). (See Part Two for information on various educational and industrial uses of CMC.)

WHEN DO STUDENTS COMMUNICATE IN CMC CLASSES?

While computer conferencing may be either synchronous or asynchronous, most applications in education and communication are asynchronous. (See the Carnegie Mellon University Committee on Social Science Research in Computing, 1985 for a bibliography of research on synchronous CMC.) Asynchronous usage has several important dimensions. In contrast to a face-to-face class which meets two to three times a week, a CMC class is open seven days a week 24 hours a day. While usage patterns may vary as a function of course design, type of students, and task requirements, this openness is a distinguishing feature of a CMC class (Harasim, 1989).

However, limited anecdotal evidence suggests that this openness can also lead to burn-out or information overload. For instance, a student in one of Davie's (1987) seminars responded, "It wasn't once a week for a few hours and then leave it. I found it a big difference in that it was continuous" (p. 19). Burn-out would seem a particular concern in applications where course length exceeds that of the normal 13 week semester (the CMC projects by the Dutch Open University and ARI for example). This issue should receive careful attention by course designers who consider sequencing classes in a lengthy course of study.

HOW DOES COMMUNICATION VIA A COMPLETELY TEXT-BASED MEDIUM AFFECT INTERACTION?

In the beginning, most initiates to computer conferencing may hesitate to contribute to discussions because of a fear of appearing unintelligent. While this concern exists in a traditional classroom, CMC technology preserves a complete transcript of the class. Deutschman (1984) notes that this permanent record "represents a real psychological hazard" for many students, particularly in the early stages (a critical time for dropout) (p. 22). Part of the fear may be traced to a misperception by many students that leaving a note in a conference

is "an act of publishing, rather than an act of speech" (Davie, 1989, p. 80).

This concern about public expression was evident in the pattern of interaction in a CMC course conducted by Harasim (1986). In the early stages of the course, students generated more personal messages than conference items, a trend which reversed itself within 2-3 weeks. The "fear of publishing" disappeared as students became more comfortable with the medium by writing personal messages and working with learning partners (Harasim, 1986, p. 63).

Another impact of the text-based communication is that class discussions in a CMC course have a more orderly flow of ideas than in a traditional class (Davie, 1987). A CMC class may have different conferences for different threads, which results in a more orderly progression of ideas within each conference.

WHAT ARE SOME OF THE PEDAGOGICAL USES OF A TRANSCRIPT OF CMC PROCEEDINGS?

While the presence of a permanent transcript is a feature that distinguishes CMC from all other forms of educational technology, its potential value has yet to be thoroughly examined.

a. The permanancy of the transcript insures that instructor-generated explanations will always be available for review at a later time. In addition, the transcript reduces the likelihood that an explanation will have to be repeated for other students at various times (McCreary and Van Duren, 1984).

b. By preserving the entirety of an instructor's explanation, the transcript is more complete than students' notes could ever be. As a result, the transcript provides students with a more complete and accurate basis for later reflection than class notes taken in haste.

c. The transcript can serve as the basis for evaluating individual and group performance. For example, a transcript is the only way to determine whether a student has met the requirement of a specified number of logons per week. But the transcript can also record the progress of small working groups and enable an instructor to assess the relative contributions of members for grading purposes. However, a transcript may be less helpful in large working groups, where the value of various contributions may be more difficult to determine (Harasim, 1988).

d. A transcript can also be the basis of an assignment. Near the end of a class, students can print out the transcript and analyze it in a number of ways, including group dynamics, philosophical or ethical positions of the participants, and the evolution of individual's positions.

HOW MUCH PARTICIPATION BETWEEN STUDENTS CAN BE EXPECTED, MEASURED IN TERMS OF PUBLIC AND PRIVATE MESSAGES?

While interaction can be expected to vary as a result of course content, instructor, course requirements (like number of logons), it may be helpful for comparison purposes to note some of the relevant information.

1. In NKI's computer conferencing course, 100 students produced a total number of 1246 written entries (Søby, 1989). This total reflects the sum of comments made in the various conferences, 4 class sections of the course, and the online cafe.

   Of the 100 students, approximately 30 were lurkers (i.e. individuals who only read) while 25 were "super active" (no numbers provided). The remaining 45 students only logged on a few times.

2. In graduate courses taught by Davie (1987):

   Students worked in learning partnerships (2 students each) and small groups in order to produce papers written on and mailed by computer. Based on 2 courses, 11-15 students each, Davie found that learning partnerships required an average of 28.2 notes to complete the assignment. This represented a mean number of 6 drafts, with a range of 3 and a high of 10.

Davie (1988) also compared usage statistics for classes taught in 1986 and 1987. There were 11 participants in the 1986 course and 15 in the 1987 one.

   a. Mean number of participants logged on per week was 9.4 for 1987 and 14.3 for 1987.

   b. Mean number of notes entered per week in the main conference was 19.2 in 1986 and 18.1 in 1987.

   c. Of the notes in the main conference, the mean number of notes authored by each student was 16.3 in 1986 and 11.8 in 1987.

In a 1989 CMC class, Davie instituted several changes, including requiring a specific number of logons per student. Over the course of the 13 week semester, 13 students produced 1950 notes.

3. The following figures pertain to graduate courses taught by Harasim (1989):

   a. One course with 38 participants generated 3,132 conference messages over 12 weeks, averaging 7 messages/person/week.

   b. Another graduate class with 29 participants generated 3,177 notes over 12 weeks, at an average rate of 9 notes per person/per week.

Summary of Student Factors Relevant to Instructional Designers

* Most students do not use course materials in the ways envisioned by designers.
* Most institutions provide students with information on study skills and time management.
* An institution has various options in insuring that distance students have access to computers.

Summary of Instructional Design Considerations

* Some evidence suggests that certain courses are more prone to drop out than others.
* CMC is particularly well-suited for courses involving discussion, group interactions and projects, and conceptual rather than hands-on training.
* In the revision process, course materials typically become longer and more demanding.
* Twenty-five students is probably a reasonable number for a CMC class.
* Generally, a variety of media facilitates both course completion and performance.
* CMC must be integral to the course or it will be under-utilized.
* Weekly course requirements should be kept in the 10-15 hour range, perhaps less.
* Completion is facilitated when students are not allowed to self-pace.

Student Factors Relevant to Instructional Designers

Students' Use of Course Materials

HOW DO DISTANCE STUDENTS USE COURSE MATERIALS? ARE THERE WAYS A DESIGNER CAN ENCOURAGE STUDENTS TO USE THEM MORE EFFECTIVELY?

Available research suggests that students do not always use the materials in the ways recommended by the course designer. For example, authors of an Open University self-study concluded that ten years of evaluation had yielded comparatively little information about how Open University students used course materials (Morgan, Gibbs, and Taylor, 1980). Because they are adults studying outside a traditional setting, students "are free

both to disregard advice given to them on study habits, and to operate some degree of selective neglect of the course materials" (Kaye, 1981a, p. 67). For example, course materials may be read less thoroughly than intended, or not at all (Hahn, Ashworth, et al., in press).

While sequencing course materials is an important concern for designers, some evidence suggests that distance students often disregard the material's order of presentation. A survey of 200 Open University science students shows 3 common approaches to study: a) start at the beginning and work through to the end; b) skim the material then dip into the material in a sequence different from the syllabus; c) use the assignment questions as a study guide. Further, when study time is restricted, students tend to abandon the course components viewed as most peripheral to success (Rumble and Keegan, 1982).

Some students are skilled at using well-designed and detailed course materials to minimize both their workload and learning. Students can "escape a class without really thinking" by becoming adept at skipping to the required information in the text (England, 1987, p. 13). These students may spend a disproportionate amount of time (50% or more) working on assignments for submission, ignoring all information that is irrelevant to this goal (Bååth, 1979).

However, course designers can employ procedures to encourage closer compliance with course materials and objectives. The following recommendations are illustrative:

1. Assignments should be written at a sufficiently high cognitive level that it is impossible for students to simply locate the answer in a text (Bååth, 1979).

2. Students can be required to write summaries and critical appraisals of their reading; assignment and test questions should be designed to require students to take a position and defend it (Holmberg, 1986).

3. Problem-solving exercises can force students to examine material on a deeper level, acknowledging different views and positions and examining grounds for their acceptance or rejection (Holmberg, 1986).

4. Students can be required to write a relational glossary, i.e. an overview of the course that describes the structure and interconnectedness of course content (Holmberg, 1986).

5. Above all, course designers need to be able to write clear substantive material without making it so refined that students have little to contribute. For example, designers need to avoid producing all the answers in a "carefully packaged format" (Holmberg, 1986, p. 30).

While distance students' approaches to course materials and patterns of study require further research, Kember and Harper (1987) review findings regarding traditional students and discuss the implications for distance students.

IS THERE A RELATIONSHIP BETWEEN TYPE OF MOTIVATION AND THE KIND OF STUDY SKILLS EMPLOYED BY STUDENTS?

For distance education students, cognitive processing skills like outlining chapters, classifying arguments into concepts, and logically connecting ideas may be more important than mechanical skills like memorization of facts (Marton and Svensson, 1982). While cognitive processing skills are also important to traditional students, students in a remote study situation can derive even greater benefit because they may have no access to lectures and peer discussions (Chacon-Duque, 1985). While CMC students can participate in peer discussions, it is still important for the instructor to encourage "depth of processing" in interactions.

Some evidence suggests that the type of cognitive skills employed by students depends on whether they are intrinsically or extrinsically motivated. Students motivated by extrinsic concerns tend to neglect the importance of cognitive processing skills and focus on the status or profit accruing from the training (Marton and Svensson, 1982). On the other hand, intrinsically motivated students focus more on content and application. For example, they engage in more elaboration of linkages among ideas, self-evaluation, selection, rehearsal, and comparison (Marton and Svensson, 1982).

IS IT COMMON FOR AN INSTITUTION TO PROVIDE ITS STUDENTS WITH INFORMATION ON STUDY SKILLS?

Most distance teaching universities provide their students with some kind of assistance regarding study methods, including information on possible study strategies, establishing personal objectives, and organizing study time (Kaye, 1981a, 1981b). For example, Canada's Athabasca University has a student handbook (Nilsson, 1988), while the Open University has a booklet, How to Study, as well as a handbook, Broadcast Study Skills Package, designed to help students learn efficiently from television and radio (Kaye, 1981a). (Studies have shown that students may even need training to maximize learning from simple technologies like audio-cassettes) (Brown, Nathenson, and Kirkup, 1982).

In an attempt to determine the quality of its students' study skills, the Open University surveyed a sample representative in terms of sex, occupation, and years of formal education. Twenty-eight of the 50 invited agreed to participate. Two thirds of these students said they had received no advice regarding organizational skills, study skills and so on. Lockwood (1986) notes that "The proportions are both surprising and disquieting when one considers the preparatory materials and advice made

available by the OU" (p. 44). Students who acknowledged the receipt of advice also commented that they had incorporated it into their routine.

Thus, some information suggests that while an institution may provide its students with study skills information, many students either do not receive it or are unaware of having received it. Given the mass of print material sent to students, it would seem advisable to emphasize advice on study skills, both in terms of its actual packaging and through numerous references to it by the instructor.

WHAT INFORMATION IS AVAILABLE ABOUT THE TIME MANAGEMENT SKILLS OF DISTANCE STUDENTS?

While little information exists on kitchen-table education as experienced by students, Riley (1984) accumulated anecdotal information regarding the way Open University course designers worked both at home and at the office. She found that while many of the interruptions to work were necessary, others seemed "self-inflicted" (Riley, 1984, p. 198). Further, interruptions at home were typically more disruptive to momentum than those occurring at the office, probably because the latter interruptions were more likely to be related to work (Riley, 1984).

While Riley's research focused on professional course designers, the study environment at home is not likely to be substantially different for students. Thus, some of her suggested time management strategies should be relevant to a student population. These include:

1. Keeping a list of interruptions per half hour, including phone calls, visitors, and number of times the student left the room. By determining which were necessary or simply self-imposed, a student is better able to effectively manage available time.

2. One way to eliminate self-imposed interruptions is to use a "piecework" system, in which a short study break, a cup of coffee, and so on are contingent upon the accomplishment of specific study goals (Riley, 1984).

WHAT IS THE AVERAGE AMOUNT OF STUDY TIME STUDENTS CAN BE EXPECTED TO INVEST PER WEEK?

Some research has shown that time commitments for distance classes tend to cluster around 10 hours per week. For example, Hawkridge (1979) found that students at the Open University tended to allocate 10 hours a week to print materials, with up to 50 minutes spent watching supplemental television programs and another 30 minutes listening to radio broadcasts. Courses at West Germany's FernUniversität typically require about 10 hours per week; however, since part-time students are required to take 2 courses a year, most students actually spend closer to 20 hours a

week for that period (Millard, 1982). When Swedish distance students were surveyed, only 34% reported spending more than 10 hours a week (Willen, 1983). In a survey of 868 Australians studying foreign language at a distance, an average of ten hours per week was reported by 18% of the sample (the largest single group) (Williams and Sharma, 1988).

While the mean study time per week is roughly ten hours, a survey of its students by Australia's Riverina-Murray Institute of Higher Education revealed an enormous range in the number of hours invested per week, even among students with apparently similar workloads (Roberts, 1986). (See Bååth, 1980 for additional research on the highly variable range of study times per course.) A similar finding was obtained at Australia's Institute of Advanced Education at James Cook University. While course requirements are typically 10 hours per week, a survey of 45 students (return rate 56%) showed the following study times (Clyde, Crowther, Patching, Putt, and Store, 1983):

mean: 18 hours, 37 minutes
median: 19 hours, 10 minutes
range: 8 hours, 10 minutes to more than 70 hours

While individual differences can be expected in study times, what is significant for course design is the discrepancy between what institutions set as recommended study times and what students actually spend. For example, in the study by the Riverina-Murray Institute of Higher Education, 80% of the students spent less time per week than what the school advised. Further, the great majority of students were successful in their studies, despite studying less than advised (Roberts, 1986).

Possible reasons for this discrepancy are inaccurate assessments of course demands as well as the willingness of many students to settle for only a satisfactory result (Roberts, 1986). For example, many students studying for some form of vocational certification were willing to simply meet and not exceed the basic requirement (Roberts, 1986). Finally, students evidently perceived the recommended study times as the maximum requirement, an interpretation which suggests that satisfactory results can be obtained by studying fewer hours (Roberts, 1986).

Students' expectations of the required study time also tend to differ from the number of hours actually committed. At the beginning of their distance studies, half of the Swedish students surveyed estimated they would spend at least ten hours per week; however, by the end of the courses, only 34% of these students reported spending over 10 hours weekly (Willen, 1983). In contrast, Swedish students without a secondary education spent more than twice as much time studying as their peers with some university experience (Willen, 1983), which suggests that they are doubly disadvantaged. Not only do they lack the background and study skills of their peers, but they must invest considerably more study time in efforts to compensate. These combined

pressures might eventually lead to drop out. (For additional information, see the section on Educational Level.)

It is important to note that the study schedules of students in a CMC course will be impacted by administrative tasks related to the computer. For example, in the ARI CMC course, students were expected to work on the course 8 hours a week and logon at least twice a week (Hahn, Ashworth, et al., in press). However, researchers found that students actually spent an average of 16 hours a week on the course, twice the estimated time. Students spent approximately 8 hours a week on learning activities and another 8 on administrative duties (uploading/downloading, printing, organizing downloaded text into notebooks, and so on). When the original time estimates were formulated, researchers had no reason to think that the administrative duties would be so time-consuming. While administrative tasks can be expected to vary as a result of software and course requirements, the estimated time for these activities should be considered when structuring the course schedule.

HOW MANY HOURS PER WEEK CAN STUDENTS IN A CMC CLASS BE EXPECTED TO SPEND LOGGED ON TO THE COMPUTER (i.e. ONLINE)?

In a graduate course offered at the Ontario Institute for Studies in Education, students were required to logon at least twice a week for a total of 2-3 online hours. In fact, averages for the two types of students (professional development and graduate) was 3.5 hours and 4.22 hours, respectively (Harasim, 1986).

However, it is important to note that time online is no longer a meaningful consideration, due to software changes that allow students to compose offline and rapidly upload or download. Using time online as a measure of student activity could conceivably show that most students in the class spent only a few minutes online per week.

WHAT IS THE LENGTH OF THE AVERAGE STUDY SESSION?

Roberts (1986) notes that the course designers at Australia's Riverina-Murray Institute of Higher Education never considered the possible implications of the average time spent per study session in the development of course material, despite the obvious face validity of this consideration. (The literature is also silent on this point.) In the study by RMIHE, researchers found that 91% of study sessions lasted less than 3 hours, while 26% lasted only an hour (Roberts, 1986). A study by the Institute of Advanced Education at Australia's James Cook University suggests that the average study session is somewhere between one-and-a-quarter to two hours in length (Clyde et al., 1983).

Accordingly, Roberts (1986) recommends that material should be designed in two hour blocks, while Kaye (1981b) suggests that

half-hour chunks of material are most easily accommodated into the schedule of the adult learner.

WHAT ARE OTHER TIME FACTORS THAT IMPACT DISTANCE STUDY?

While acknowledging the importance of determining average length of study time, Clyde et al. (1983) emphasize that it is also necessary to investigate the period during which the work is completed. For instance, only one of the students surveyed reported working on the module on a daily basis; the other twenty-four students studied more intermittently.

Some support for this finding was provided by a survey of Australian foreign language students which revealed 3 patterns of study (Roberts, 1986): consistent (students tried to work a set amount of time per day); intermediate (students tried a consistent schedule but often yielded to pressure of assignments and tests); and pressure: (peaks and troughs of activity occurred because students' work was entirely driven by assignments and tests). However, these study patterns were not related to successful performance (Roberts, 1986).

Convenient Access to a Computer

IS CONVENIENT ACCESS TO A COMPUTER NECESSARY FOR SUCCESSFUL PERFORMANCE IN A CMC CLASS?

Ready access to a computer is virtually a prerequisite for successful performance in CMC (Harasim, 1986; Lorentsen, 1989; Lorentsen et al., 1989). In many conferences conducted by the Institute for the Future, lack of convenient access to a computer was a major factor in non-starters and low usage by others (Vallee et al., 1974). Likewise, in the CMC study by Denmark's Jutland Open University, low usage was reported for students who had to use computers at local study centers, compared to other groups that had computers in their homes. Traveling to study centers entailed sacrifices in terms of additional time and planning. In addition, the resulting absence from the home heightened the visibility of the student's coursework, emphasizing the student's obligation to responsibilities outside the home (Lorentsen et al., 1989).

Furthermore, some evidence suggests there may be performance differences between students who have convenient access to computers at home or work, compared to access only at study centers. In the study by Jutland Open University, students who had convenient access tended to learn the system more quickly and and to set the agenda for discussion. In contrast, study center students logged on to find an overwhelming number of contributions to a discussion they had not had an opportunity to help define. As a result, these students were more likely to read than to become active participants in the discussion (Lorentsen et al., 1989).

WHAT ARE SOME OF THE OPTIONS IN INSURING STUDENT-ACCESS TO COMPUTERS?

Since convenient access to a computer impacts successful performance, institutions teaching CMC courses have the option of either supplying computers to students (the procedure used in the ARI CMC course), placing computers in local study centers (a procedure employed by Denmark's Jutland Open University), or requiring students to provide their own. However, requiring students to supply their own may result in a technological Tower of Babel due to incompatibility of equipment (Muzio, 1989).

The Open University surveyed its students on various issues related to computer access. Based on the results, effective in 1988, the Open University shifted responsibility for insuring computer access from the Open University to the students (Kirkwood, 1989). At the present time, this policy only affects a total of 11,000 students in five computing classes. Henceforth, these students have three options:

a. purchase an IBM or IBM-compatible from a specified vendor who has an agreement with the Open University

b. rent a computer from the Open University for the necessary time period

c. borrow a machine from the Open University only for short periods of time and only in the event of hardware problems

The New Jersey Institute of Technology (NJIT) has a rather similar policy. The NJIT issues computers to all in-coming freshmen, because all freshmen courses require computer usage (Hiltz, 1990).

While information on this point is very sketchy, there are precedents for requiring students to provide their own computer for CMC courses. Indeed, many colleges in the U. S. are beginning to place such a premium on computer literacy that students are encouraged and sometimes required to have their own. In the future, it should become even more reasonable to expect students in industrialized nations to have access to a microcomputer.

AT THE PRESENT TIME, HOW COMMON IS IT FOR STUDENTS TO ALREADY HAVE ACCESS TO COMPUTERS?

In its 1988 survey, the Open University determined that 1/3 of its students had access to a microcomputer, and that of this percentage, over 18% had access to one at home (Kirkwood, 1988). Prior to conducting its pilot study of a CMC course, the Dutch Open University determined that "lack of student access to a personal computer is not a major barrier to its use on a larger scale in DOU courses" (van Meurs and Bouhuijs, 1989, p. 36). In 1987, a survey had shown that 56% of its students had access to a

microcomputer (36% at home and 20% with access to one elsewhere); access was even higher among its science students, 81% of whom reported convenient access. However, modems were still comparatively rare among all groups of students (van Meurs and Bouhuijs, 1989). In another case, the Rochester Institute of Technology surveyed its students prior to designing a CMC adjunct for some of its courses and found that access to a microcomputer was not a problem (no figures were reported) (Bissell et al., 1987).

However, the issue of convenient access is somewhat more complicated than it first appears. While the issue of access is often a major concern, Kirkwood (1988) notes that quality of access, particularly in the home, is an important factor impacting successful performance. For example, performance can be affected if it is impossible to locate the computer in a quiet part of the home, if it must be assembled and disassembled for use, if it does not have convenient access to a telephone for modem use, or if the computer disrupts other family members (Kirkwood, 1988). In the CMC course implemented by the Open University, surveys revealed that 2/3 of the 1264 students were able to leave their computer workstation permanently set up. However, a sizable 1/3 of the students were not (Mason, 1989). (See Kirkwood, 1988 for a detailed study of this issue.)

A related problem is lack of access due to travel obligations. In the ARI CMC study, students whose travel requirements cost them access to a computer found it difficult to make up the work (Hahn, Ashworth, et al., in press). One way to minimize this problem is to supply students with or encourage them to purchase, portable computers. Since portables are also sturdier, an institution which supplies computers to students should be able to minimize costs due to shipping damage as well as reducing the chance of hardware problems that can impact students' performance.

Typing Ability

DO PEOPLE HAVE TO BE GOOD TYPISTS TO PARTICIPATE SUCCESSFULLY IN A CMC COURSE?

Because CMC is a text-based medium, it might seem that poor typists would be at a distinct disadvantage. However, most studies have found no relationship between typing ability and user acceptance (Kerr and Hiltz, 1982). In one respect, good typists have a speed advantage, but differences between computer and typewriter keyboards can reduce transfer, thereby lessening the liability of inexperience (Vallee et al., 1975). Also, the asynchronous nature of the medium allows the participant to work at a pace commensurate with typing ability (Vallee et al., 1975).

However, some research by the Institute for the Future suggests that typing ability can affect performance in subtle, though not necessarily negative ways. Slower typists may be more

selective in their responses, which is not necessarily a liability in a medium which can subject its participants to information overload. However, these differences in quantity do not address the quality of the responses made by experienced and inexperienced typists. Indeed, researchers at the Institute for the Future note that detailed performance data are not available (Vallee et al., 1975).

While no data indicate that poor typing ability has an adverse impact on performance, it would seem advisable for designers to insure that typing tutorials are available upon request.

Rate of Assignment Submission

CAN RATE OF ASSIGNMENT SUBMISSION HELP PREDICT COURSE COMPLETION?

Wong and Wong (1979) compared assignment completion with attrition in a correspondence course on basic accounting. Students had a significantly better chance of completing the course even if they did only three of the six assignments. Those who submitted four or more assignments had a better than 90% chance of completing the course. Other studies conducted by Athabasca University, the Open Learning Institute (both Canadian), and the National University Extension Association (USA) also found that the rate of assignment completion was a strong predictor of course completion (Woodley and Parlett, 1983).

In general, the most critical period of the course in terms of dropout seems to be up through the one third to halfway point. Course designers and instructors can assist students through this critical time by:

a) Designing content and scheduling assignments to minimize student anxiety (Wong and Wong, 1979). For example, the first assignment can be very short to encourage early participation (Bååth, 1980; 1982). Since non-starters in a course may outnumber actual dropouts (Bååth, 1984), this step might be effective in reducing the rate of non-start.

b) Increasing student involvement in the course by providing a greater number of short assignments mailed at regular intervals rather than a few lengthy assignments presented at the outset of the course (Wong and Wong, 1979; Bååth, 1980).

c) Requesting instructors to maintain a high level of feedback on student performance.

DOES THE TYPE AND FREQUENCY OF FEEDBACK HAVE IMPLICATIONS FOR INSTRUCTIONAL DESIGN?

Feedback is intrinsically related to instructional design, because materials should be designed with type and frequency of feedback in mind. While assignments can be the context for instructor-student contact, research by Bååth (1980) suggests that very frequent (high density) assignments can have a negative impact on at least two groups of students. Highly autonomous students may not only prefer lower assignment density but actually perform better under conditions of lessened compulsory contact (Bååth, 1980). In addition, many correspondence students may regard assignments as a kind of test, and thus may be subject to test anxiety which can in turn, lead to poorer performance and even lower completion rates (Bååth, 1980).

Thus, while high density assignments facilitate instructor-student interaction, there are trade-offs. It is ultimately important to require instructor-marked assignments only when this kind of feedback is warranted.

Self-check exercises can be used to replace some of the compulsory instructor-graded assignments, providing they cover the same material as the assignments and include model answers and comments (Bååth, 1980). In a CMC course conducted by the Dutch Open University, self-assessment questions were available through CAL. Despite occasional computer problems that hindered access, students who used the self-check exercises utilized them completely, including extra explanations, hints, and sub-questions. In fact, survey questions disclosed that students preferred the depth of feedback provided by CAL to the normal written feedback of an instructor (van Meurs and Bouhuijs, 1989).

Thus, instructional designers need to assess the objectives of various assignments. If a major purpose is to encourage student-instructor interaction, high density assignments may be effective for most students; however, some research suggests that they can also depress both performance and throughput for others. One of the benefits of CMC compared to predominantly paper-based forms of distance education is that it enables a wide range of instructor-student interaction, available on an individual or group basis. In other words, CMC provides many occasions for interaction beyond assignments.

Course Factors

ARE SOME COURSES MORE PRONE TO HIGHER DROPOUT RATES THAN OTHERS?

Some evidence suggests that the type of course affects completion rates. For example, an institution-wide study by the University of Lund (Sweden) showed that only 31% of its students completed the assigned work. The variation in dropout across courses was considerable. An advanced economics course had a dropout rate of 92%, while a short practical course on the

Psychology of Management had a dropout rate of 36% (Bååth, 1982). A self-study by the Open University found that math and technology courses had higher dropout rates than arts and social sciences (Woodley and Parlett, 1983). In addition to evidence regarding these specific subject areas, Bååth (1984) notes that short vocationally-oriented courses have comparatively good completion rates, especially if the course will lead to job advancement for the student.

While evidence is sketchy, it does suggest that some courses intrinsically have a higher rate of dropout. However, designers can be influential in reducing this figure to a minimum. For example, Woodley and Parlett (1983) suggest that course factors may play an overt or subtle role in a student's decision to drop out. They cite one student's survey response: "Work pressures meant that I had less time for Open University study --but I guess that I would still have stuck with the course if I had found it more interesting" (p. 8). Similarly, a study at the NKI (Norway) seemed to indicate that most dropout was a function of student variables like shortage of time, change in job or career, illness, and so on. However, closer observation revealed problems within the institution's control, such as problems with the course material, tutor performance, turnaround time of assignments, and so on (Rekkedal, 1983). In short, the depth of questions asked by an institution impacts the reasons given for dropout (Cookson, 1989).

Woodley and Parlett (1983) summarized specific course factors reported by students which influenced their decision to drop out:

badly designed courses
course over-loaded given its credit rating
course too difficult or insufficiently rigorous
content differed from course description
poor quality of broadcasts (either in terms of reception quality or content)
late mailings, ambiguous questions etc.

These findings suggest that in distance education, the instructional design and implementation (including tutor responsibilities) can often override external factors which would otherwise lead to drop out. In other words, the primary responsibility for student retention may rest with the quality of an institution's instructor, courses, and support services.

HOW DOES CMC INTERACT WITH VARIOUS TYPES OF COURSE CONTENT?

The number of courses taught via CMC constitutes an appreciably smaller sample size than the total number of courses taught at a distance. Because of the comparatively smaller number of implementations, it is impossible at this time to identify any courses at risk because of content. At the present state of the art, dropout in a CMC class is more likely to be a function of hardware and software problems than course content per se.

However, another way to approach this issue is to inquire what types of content are most easily adapted to fit the capabilities of a CMC class. CMC is particularly effective for courses with considerable pragmatic content (Turoff, 1984) or those which invite discussion rather than mere transmittal of information (Smith, 1988; Turoff, 1984). In fact, CMC may be superior to face-to-face interaction for these contexts, because students have time to reflect and offer well-formulated responses (Turoff, 1984). Finally, CMC is appropriate for courses which do not rely too heavily upon manipulation of actual objects or mathematical symbols (Smith taught a course on special relativity using CMC) (Smith, 1988). Software developments, including graphics and simulations, should further increase the range of courses that can be effectively taught with CMC.

One of the most original applications of CMC in education was its use in foreign language study where it was an adjunct to a face-to-face course (Smith, 1989). Compared to control students who attended a conversational face-to-face lab, students who participated in a CMC lab showed a significantly better ability to read and express written ideas (Smith, 1989). The speaking and listening abilities of CMC students even improved, perhaps because these abilities have a non-vocal component that can be practiced via CMC (Smith, 1989).

Courses for remote delivery by CMC must be carefully chosen in order to maximize both student performance and utilization of the technology. While little evidence exists regarding which courses are appropriate for CMC, there are suggestions that it is well-adapted for most conceptual and discussion courses. Further research is needed to explore the range of cognitive abilities that can be enhanced in a CMC classroom.

WHAT PROBLEMS FREQUENTLY OCCUR DURING THE DRAFTING OR REVISION OF PRINT-BASED MATERIALS?

After reviewing print materials used in a number of distance courses, Bååth (1986) noted that:

1. In many cases, the first unit of a course was considerably more difficult (i.e. less readable) than later units, unfortunate because the first assignment can significantly impact course completion.

2. The study guide was often more difficult than the text it purported to explain.

Another design factor that can negatively impact student performance is the amount of material covered in a course (Diehl and Lowe, 1981). This observation is of particular importance as authors rewrite correspondence courses to maintain their relevance. For example, in studies of Air Force Career Development Courses, the number of courses with seven or more volumes increased from two to twenty-eight during a five year

period (Diehl, 1987). In addition, the growth of material within courses was characterized as "creeping"; as courses were revised, they increased not only in overall length, but in longer intermediate sections. (Diehl, 1987). To further compound the problem, the increase in length was primarily an increase in text rather than an increase in both text and number of illustrations (Diehl, 1987). As a result, there was a disproportionate increase in the amount of material students had to read and retain.

Course developers should consider the following issues in revising and expanding their courses (Diehl, 1987):

1. Course length should be acknowledged as a potential instructional design problem. If too much new material is added in updates or revisions, old material should either be removed, the course broken into two shorter courses, or both.

2. Volume one of a multivolume course (as well as its internal sections) should be shorter than later volumes.

WHY IS SEQUENCING OF MATERIAL FOR A CMC CLASS SO IMPORTANT?

In contrast to a live discussion which occurs within a timespan of a few minutes, a CMC discussion on a specific topic may evolve over weeks or months, either spontaneously or by design. Rather than presenting material in sequential fashion, Smith (1988) emphasizes that computer conferencing is most fully utilized when ten topics are discussed for ten weeks, rather than at the rate of one per week. In fact, the only way to cover the required information during a fixed period of study may be to utilize multiple threads of discourse instead of the sequential presentation typical of traditional courses (Quinn, Mehan, Levin, and Black, 1983). Designing a course to encourage multiple simultaneous threads may require "substantial re-organization of the course outline" (Quinn et al., 1983, p. 325). As a result, an instructional designer may bé required to restructure the order of presentation as well as the relationship between topics.

CAN THE INCORPORATION OF A VARIETY OF MEDIA INTO A DISTANCE CLASS IMPROVE STUDENT PERFORMANCE AND COMPLETION?

The importance of variety of media in facilitating course completion is one of the most robust findings in the distance education literature. Pentz and Neil (1981) suggest the following as a general principle in distance education: "The wider the range of media used in a distance learning course the greater is the proportion of students who succeed in learning effectively" (p. 102). The obverse of this practice is described by Moore (1989): "The main weakness of many distance education programs is their commitment to only one type of medium. When there is only one medium it is probable that only one kind of interaction is

permitted or done well" [learner-content, learner-instructor, or learner-learner] (p. 5).

The type of media used varies with the country, the institution, and the training requirements. Media in distance education include newspapers, packets of correspondence materials, radio, television, audio and video conferencing, and CMC. Most distance courses utilize a multi-media approach (Bacsich, Kaye, and Lefrere, 1986), although 68% of the institutional respondents in a worldwide survey of distance education reported that print-based materials were the single most important component (Holmberg, 1985).

The Tokyo Institute of Education performed experiments comparing combinations of texts, television, computerized quiz feedback sessions, and tutorials. Dropout was lowest when all four media were employed in a course (Pentz and Neil, 1981). In related fashion, the results of an Open University study show that the more television and radio programs associated with a course the lower the dropout rate. For the period 1971-1981, the correlation between dropout and television was -.38, while radio programs correlated -.36 with dropout (Woodley and Parlett, 1983).

However, it is important to note that integration of various media requires "incredibly careful planning" (Hawkridge, 1979, p. 18). And the more thoroughly integrated course materials are, the more difficulties are compounded if some component has to be altered. For example, a textbook used but not published by the Open University went out of print, necessitating major changes in course material, including other media which made reference to it (Hawkridge, 1979).

In addition to facilitating completion, variety of media can also impact performance. For example, similar material can be presented via several different media in order to provide students with multiple learning opportunities as well as built-in redundancy to facilitate acquisition (Mason and Kaye, 1990; Pentz and Neil, 1981).

The issue of variety of media is not restricted to distance learning courses; teachers in many traditional classrooms incorporate films, field trips, guest speakers and so forth into the course. Variety may just be pedagogical common-sense.

WHAT ISSUES SHOULD BE CONSIDERED IN INCORPORATING A VARIETY OF MEDIA INTO A CMC COURSE?

CMC can provide course designers even greater selection and flexibility in their choice of educational resources than has hitherto been possible. Eventually, CMC will allow students access to electronic databases as well as information stored in other electronic forms. Besides expanding the range of educational opportunities, CMC could reduce an institution's reliance on printed materials and the almost inevitable delays in

feedback due to slow postal service. (See Rekkedal, 1985 for studies on the effect of reducing postal turnaround time on student completion.)

A second consideration in integrating media into a CMC class pertains to the visual nature of CMC. Courses delivered via CMC require students to visually assimilate material. Yet research on cognitive styles suggests that individuals vary in their ability to process information visually (Turoff, 1984). However, while cognitive style appears to be a non-modifiable characteristic, Turoff (1984) suggests that combining CMC delivery with other media could insure that some students are not selectively disadvantaged because of their cognitive style.

WHAT IS THE MOST IMPORTANT ISSUE IN INCORPORATING CMC INTO AN ALREADY EXISTING DISTANCE COURSE?

Because CMC is relatively new, most attempts at educational implementation have entailed adding it to already existing course materials. As a result, CMC has often been an adjunct rather than an integral part of the course. One of the most robust findings in the literature is that tacking CMC on to existing materials may negatively impact usage rates.

The Open University examined tutors' voluntary usage of CMC for communication, mutual support and the exchange of information. The medium went largely unused, with tutors acknowledging that they would be motivated to use it only when required to do so (Mason, 1987). Similar results were obtained with students in the Open University CMC course, where strictly voluntary usage meant low usage (Mason, 1987; Mason and Kaye 1990). Students had been instructed in the use of CoSy in the second block of the course, but there were no requirements to log on after that. "Indeed, frequent logging on by students was never envisioned by the course team and regular contributions from all 1300 users would if it didn't crash the system, certainly have overloaded the conferences..."(Mason, 1989, p. 132). In fact, CoSy was never "specifically spelled out as a teaching medium or a vehicle for course presentation", and counted as no more than 5% of the course activities (Mason, 1989, p. 136).

While students in the ARI CMC course generally had a favorable opinion of CMC, they complained of the additional time its use entailed. Because the work involved was not reflected in the course grade, students often abandoned it when time became limited (Hahn, Ashworth, et al., in press). Likewise, in an evaluation of another CMC class, students reported that they were more likely to stop participating when they became busy than if they were in a face-to-face lecture environment (Hiltz, 1984). Researchers at the Institute for the Future found that individuals who were less motivated to communicate with other group members were more inclined to use a traditional (and less demanding) means. (Vallee et al., 1975).

Despite a small number of case studies, it is clear that CMC will be used only when participants are required to do so (whether it be a need to communicate, requirement for a grade etc). In fact, motivation may be the single most important variable in utilization of a conferencing system. Motivation may be encouraged by requiring a mandatory number of logons per week, a minimum number of messages, and so on (Hahn, Ashworth, et al., in press). Usage may also be encouraged by insuring that important information (such as quiz questions and answers or instructor responses to questions) is only accessible through the computer (McCreary and Van Duren, 1984).

The success of a CMC course depends, in part, upon making CMC so integral to course content that students cannot succeed without using the conferencing system (Feenburg and Bellman, 1990). However, requiring this level of participation also obligates an institution to provide user support and user friendly training in computer skills (Lorentsen, 1989). Both course designers and instructors need to help acculturate students to the new technology, including ways that communication patterns are similar to and different from face-to-face. In this respect, the Open University CMC course is illustrative. Students almost unanimously blamed lack of time as the reason they tended to lurk rather than make substantive contributions. However, Mason (1989) notes that this "constant refrain begins to sound like noise generated to cover a more basic cause - the lack of a clear model on which to base their conception of how to participate" (p. 137).

Pacing

WHICH IS MORE EFFECTIVE IN FACILITATING COMPLETION, SELF-PACING OR INSTRUCTOR-PACING?

At most distance universities, courses leading to formal qualifications generally have established completion dates. These dates not only facilitate institutional record-keeping but increase student completion rates (Pentz and Neil, 1981). Evidence suggests that while students may prefer individual pacing, student dropout is higher than under conditions of instructor-pacing (Coldeway, 1982; Morris, Surber, and Bijou, 1978).

The impact of self- vs. instructor/institutional pacing on dropout and performance has rarely been explored in the CMC literature, perhaps because of the nature of the implementations. In general, instructors who are using CMC as an adjunct to face-to-face teaching or as an experimental alternative to it, still face the constraints of a fixed semester length.

However, self-pacing vs instructor pacing was studied in the ARI CMC experiment. The results are shown in Figure #1.

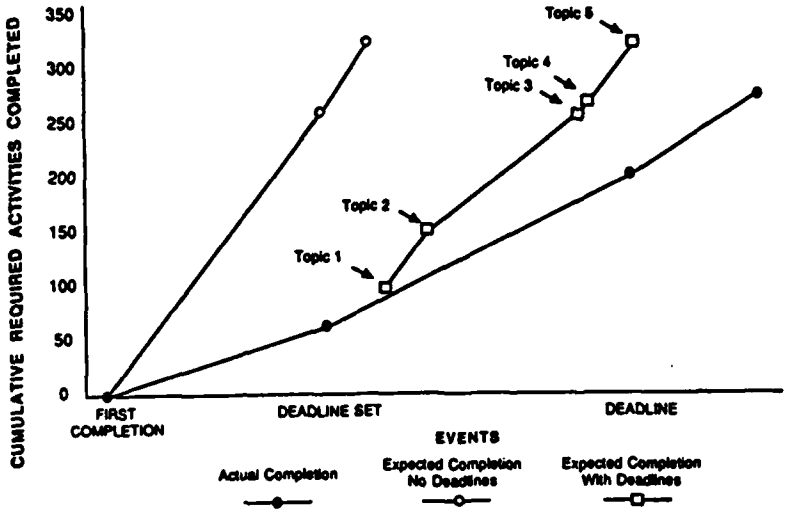

Figure 1. Course progress under conditions of self-pacing vs. instructor pacing

When students were allowed to proceed at their own pace, they scarcely progressed at all. When pacing mechanisms were instituted, students progressed at rates that were usually commensurate with the expectations of the course team. For example, Figure #2 shows the minimal discrepancies between expected and actual time to complete various activities.

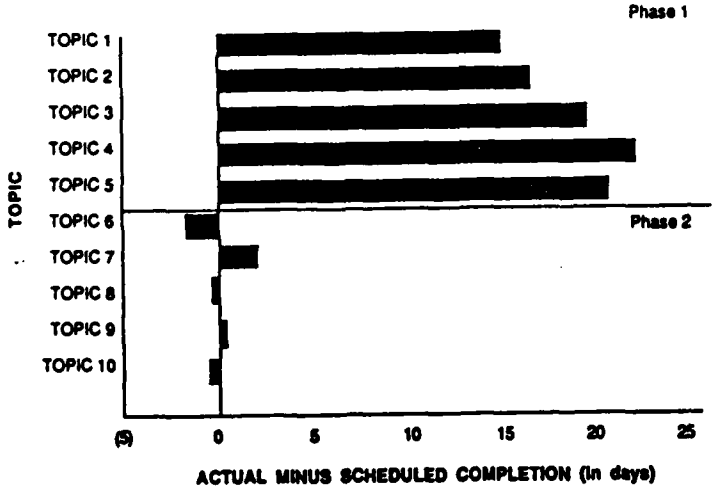

Figure 2. Difference between expected and actual number of days for topic completion under self-pacing (phase 1) and instructor pacing (phase 2)

Thus, some degree of instructor pacing seems advisable in any distance education course. This recommendation is made despite the fact that one of CMC's principal advantages is its flexibility in time and place.

WHAT ARE THE VARIOUS MEANS A DESIGNER CAN USE TO PACE STUDENTS?

While adult students typically value the flexibility of distance study, they often appreciate the imposition of structure and accountability in order to facilitate their progress. There are many ways a designer can introduce structure into the distance setting. The first is due dates. An Open University study found that many students used assignment completion dates to pace themselves, with lag periods following each due-date. In many cases, these lag periods were considerable, with students falling up to four weeks behind recommended start dates for portions of the material (Kaye, 1981a).

Some limited evidence suggests that lag periods of low response rates can also be expected in a CMC course. Harasim (1986) reports low response rates after students completed demanding group presentations. The deadline for the group projects also coincided with the Easter holiday as well as the deadline for the educator-participants in the class to submit report cards for their own students. Most of the participants returned to their normal levels of interaction following this busy period (Harasim, 1986). (It is worth noting that lag times may be an intrinsic part of distance study and do not necessarily indicate that pacing mechanisms are ineffective. In fact, limited research indicates that while some students study consistently, others study more intermittently, and in some cases, study only prior to tests and due dates.)

A second form of pacing is media broadcasts at times scheduled by the institution. For example, French correspondence students listened to radio broadcasts as part of their course of study. When the broadcasts were replaced by cassettes, many students refused to listen to them. Unlike the cassettes, radio broadcasts served as an incentive to keep students motivated and on track (Pentz and Neil, 1981). Likewise, in a study at the Open University, survey responses showed that 60% of the adult learners found the weekly television programs were helpful in pacing their study schedule (Sell, 1976). (With the increasing availability of video-cassette recorders and the flexibility they afford, it is unclear whether scheduled broadcasts could maintain their usefulness as pacing mechanisms.)

Some institutions, like NKI (Norway), have experimented with reminder postcards and letters as ways of prompting student activity. The NKI conducted an experiment examining the effect of sending inactive students a sequence of one reminder postcard and two letters at one month intervals if a month passed without submission of an assignment. By the third month, 46% of the experimental group had submitted work, compared to only 31% of control subjects (Rekkedal, 1983).

WHAT PACING MECHANISMS ARE AVAILABLE IN A CMC CLASS?

The same techniques used in distance education can also be used in CMC education, including assignment and course completion dates, media broadcasts, and postal mail. However, there are unique features of the CMC environment which have implications for pacing: group interaction and gating.

CMC is virtually the only media to allow for group work at a distance. Group assignments are one way to pace students, because in order to make contributions to their group, students must be on schedule (Hiltz, 1986). The evaluation of the ARI CMC course showed that students tried very hard to stay on schedule in order to be prepared for group exercises; concern about letting other students down was highly motivating (Hahn, Ashworth, et al., in press). Furthermore, the fact that group work unfolds over a period of days in a CMC class would seem to enhance its effectiveness in pacing (Hahn, Ashworth, et al., in press).

A second pacing mechanism in a CMC class is gating, a capability in some conferencing software which allows students access to material only when the prerequisites have been completed. This capability not only helps preserve the sequencing of materials envisioned by course designers, but also helps reduce information overload for the CMC novice. In fact, newcomers to CMC should have access to specific material only when ready (Vallee et al., 1975); thus, gating can not only preserve course integrity but also serve as one way of pacing students.

Another mechanism for pacing CMC students is to allow them computer access to certain activities for a limited period of time. For example, a professor at the New Jersey Institute of Technology scheduled readings and discussion questions that could only be accessed on the computer from Monday through Wednesday of each week. During the second half of the week, students were to take an online quiz. These activities helped pace students by allowing them limited access to assignments and quizzes stored on the computer (Hiltz, Shapiro, Ringsted, 1990).

WHEN AN INSTITUTION'S PACING MECHANISMS ARE INEFFECTIVE IN INSURING TIMELY COMPLETION, SHOULD COURSE COMPLETION DATES BE EXTENDED?

Very limited evidence suggests that extending course completion rates may yield only a small return in the number of students who finish. Sell (1976) reports that an Introductory Psychology course at the University of Nebraska had just under a 50% completion rate by the nominal ending date of the course. When the deadline was extended five months, the completion rate increased to 64%. Thus, most of the students who will complete the course will probably do so by its original completion date. Extending deadlines may not justify unnecessary institutional expense and record-keeping.

Class Size

WHAT IS THE OPTIMAL SIZE OF A DISTANCE CLASS?

No reliable information exists on the optimal size for a distance learning course. This figure can be expected to vary as a function of the media, the course content, the type of feedback, and so on. However, it is reasonable to expect that larger classes can lead to less instructor-generated feedback, slower response time by the instructor, and possibly, a higher rate of student attrition. In fact, a study conducted by Woodley and Parlett (1983) of dropout at the Open University found an inverse relationship between instructor interaction with individual students and increases in course size.

However, the question of optimal size of a CMC class is more complex. The effectiveness of a CMC class may suffer if there are too few participants. Hiltz and Turoff (1978) suggest that one important reason for the failure of a conference is the lack of a critical mass. An insufficient number per se, or an insufficient number of "vocal" members, can mean there are relatively few messages to read or respond to. For example, Manock (1984) noted a disappointing rate of participation in a class of eight to ten students, while a larger class of over seventy participants generated many lively discussions and debates.

It is important to note that the "real" class size is often much smaller in CMC than the enrollment numbers would indicate. For example, research suggests that a minority of members (10%) can account for up to 50% of the messages. In contrast, between 20%-25% of the students in a class will often be lurkers, i.e. people who read but do not actively participate (Hiltz, 1984).

The largest CMC class ever offered has been completed at the Open University. This course involved 1264 students and 65 tutors (of the original 1364 students who registered, 100 dropped almost immediately) (Mason, 1989). While all 1264 students had "read and write privileges" in one branch of the network, only 25 or so students participated in each tutor's group. As a result, the "actual" group size was more commensurate with that of a traditional class than the numbers first suggest.

The evaluation of this Open University course revealed that the small tutor conferences sometimes lacked a critical mass of participants, while the number of messages in the national conferences was often overwhelming. As a result of the evaluation, several changes were introduced: participation in the national conference became optional; tutor conferences focused on local matters and assignments; and a regional conference with sufficient critical mass became the primary forum for course discussion (Mason, 1990). (For a discussion of various philosophical, pedagogical, and practical considerations in incorporating CMC within large-scale settings, see Mason and Kaye, 1990; Heap, 1990).

Twenty-five is a fairly recurrent number in case studies of CMC classes. Davie (1989) notes that he can teach about as many students in a CMC class as face-to-face, about twenty-five. A Norwegian CMC course had a main course conference of 100 students, 1 professor, and four tutors. However, there were four smaller "classes", each with 25 students (Søby, 1989). Hahn, Ashworth, et al. (in press) project that an instructor could handle 50 students, with full-time administrative assistance.

Face-to-Face Meetings

DOES THE SUCCESS OF A CMC COURSE DEPEND UPON AT LEAST ONE FACE-TO-FACE MEETING AMONG ALL PARTICIPANTS (TYPICALLY AT THE BEGINNING)?

One of the most persistent beliefs in CMC instruction is that a successful conference is facilitated by face-to-face contact prior to a period of computer communication only. For example, graduate courses at Canada's Ontario Institute for Studies in Education and Nova University (U.S.), as well as the executive development courses at the Western Behavioral Sciences Institute (U.S.) incorporate some face-to-face meetings prior to and sometimes during delivery of the CMC course.

However, few if any studies have experimentally compared CMC courses delivered with and without a face-to-face component. Indeed the belief in the importance of face-to-face contact may reflect a value judgment which can restrict unbiased exploration of alternative means of communication not as surrogates for face-to-face, but as valid forms in their own right. For example, the Institute for the Future evaluated 28 computer conferences characterized by a wide range of users and topics. They concluded that "interaction within conferencing groups has not been related to prior face-to-face acquaintance of participants but has represented new patterns of association" (Vallee et al., 1974, p. xiii).

Other implementations have also succeeded without any face-to-face meetings. Norwegian courses using the EKKO conferencing system have consisted of exclusively computer encounters (Paulsen, 1987). The Open University CMC course was designed without a face-to-face component because of class size (1264 students and 65 tutors) (Mason, 1989). Designing a 'front-end' to the conferencing software and providing students with an audio cassette (designed to talk them through the first logons) were effective in training computer skills without a face-to-face meeting (Mason, 1990).

The ARI CMC course was also designed without a residence requirement in order to determine whether successful completion and performance were contingent upon face-to-face meetings (Hahn, Ashworth, et al., in press). In this respect, it is worth noting that ARI CMC students were surveyed at the end of the course about

the perceived value of a face-to-face meeting at the beginning. The majority were unsure it would have been possible to develop any personal relationships in the limited time that would have been available. Finally, the Connected Education Program (Levinson, 1989) does not utilize face-to-face meetings in order to avoid disadvantaging students who live as far away as Tokyo and Singapore.

Regardless the degree of geographic dispersion, face-to-face meetings can place additional time and financial constraints upon students. If a course can succeed without such meetings, institutions need to determine whether there are any accrued benefits that justify the demands imposed on students.

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PART TWO:

International Resources in CMC and Distance Education

OVERVIEW

Selected List of Distance Teaching Institutions and Organizations is a list of institutions and multi-national organizations involved in distance education. The purpose of this resource is to show both the number and range of industrialized and third world countries involved in distance study.

Distance Education and Graduate Study contains brief descriptions of institutions offering either graduate study at a distance or graduate study in the subject area of distance education.

Implementations of Computer-mediated Communications contains:

a) A chart of educational applications
b) A chart of communications applications
c) Annotations, providing additional information where available

Information on Computer Conferencing Software contains:

a) A chart providing a comparative description of the major computer conferencing systems
b) Contact information, including telephone numbers, for the vendors of the major conferencing systems

Reference Information for CMC and Distance Education contains:

a) An International List of Distance Education Publications (the names and addresses of publications that are either devoted exclusively to the area of distance education or that will accept articles directly related to distance study)

b) International Clearinghouses for Distance Education Resources (a description and addresses for some of the major international documentation centers for distance education, including those in the United Kingdom, Norway, Australia, and West Germany)

c) Selected Bibliography (references in computer-mediated communication, distance education, information technology, media selection, and adult education)

Selected List of Distance Teaching Institutions and Organizations

This section focuses on distance teaching institutions as well as organizations in order to convey the range of international implementations of distance learning. The names on this list were gleaned from available literature; as such, this list is intended to suggest the range, distribution, and number of distance education institutions both in industrialized and third world countries. However, the compilation of a complete list of such institutions is beyond the scope of this report.

* For a discussion of the various models of distance teaching, see Kaye (1981).

* For overviews of distance education in the United States, see Miller (1989) and Williams, Eiserman, and Quinn (1988).

* For a directory and selective bibliography of institutions (including mailing address and projects), see Harry (1982).

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Selected List of Foreign Distance Teaching Institutions by Country

Australia
- Brisbane College of Advanced Education
- Capricornia Institute of Advanced Education
- Darling Downs Institute of Advanced Education
- Deakin University
- Gippsland Institute of Advanced Education
- Macquarie University
- Murdoch University
- Orange Agricultural College
- Riverina College of Advanced Education
- South Australian College of Advanced Education
- University of New England
- University of New South Wales
- University of Queensland
- Victoria College
- Victorian TAFE Off-Campus Network
- Warrnambool Institute of Advanced Education
- Western Australia College of Advanced Education

Austria
- Austrian Research Institute of Distance Education

Bangladesh
- Bangladesh Institute of Distance Education

Botswana
- Botswana Extension College

Brazil
- Educational Television Foundation of Maranhao

Burma
- Department of University Correspondence Courses
- Mandalay Arts and Science University
- Rangoon Arts and Science University

Canada
- ACCESS Alberta
- Athabasca University, Alberta
- Brandon University
- Memorial University, Newfoundland
- North Island College, British Columbia
- Open Learning Institute, Richmond, British Columbia
- Simon Fraser University, Burnaby British Columbia
- Télé-université, Quebec
- TVOntario
- University of British Columbia
- University of Manitoba
- University of Regina
- University of Saskatchewan
- University of Victoria, Victoria, British Columbia

University of Waterloo
Wilfrid Laurier University, Ontario

China
Central Broadcasting and TV University
Heilongjiang Provincial Television University
Shanghai Television University

Colombia
Accion Cultural Popular (ACPO)
Open University Programme, Javeriana University (OUP)

Costa Rica
Universidad Estatal a Distancia (UNED)

Czechslovakia
Karls University

Denmark
Aarhus Technical College, Aarhus
University of Jutland

Dominican Republic
RADECO

Federal Republic of Germany

Bavarische Telekolleg
Fernuniversität (FU)
German Institute for Distance Studies at Tübingen (DIFF)
Radio College
Television College

Fiji
University of the South Pacific

Finland
University of Kuopio
University of Joensuu
University of Helsinki
University of Turku

France
Télé-CNAM branch of the French Collège National des Arts et Métiers
Entente de L'Est
Centre National de Télé-Enseignement (CNED)

German Democratic Republic
Karl-Marx Universität

Hong Kong
The Open College

India
- Andhra Pradesh Open University
- Central Institute of English and Foreign Languages
- Himachal Pradesh University
- H.P. University
- Indira Gandhi National Open University
- Institute of Jammu
- Kurukshetra University
- Panjab University
- Punjab University
- Regional College of Education
- SNDT Women's University
- University of Allahabad
- University of Delhi
- University of Kerala
- Utkal University Vani Vihar
- * Open Universities are also located in the states of Rajasthan and Bihar
- * Open Universities have been proposed in Gujarat, Kerala, Karnataka, Uttar Pradesh, Maharashtra, Orissa, and West Benghal

Indonesia
- Indonesia Open University (Universitas Trebuka)

Iran
- Free University of Iran (FUI) (No longer operating)

Israel
- Everyman's University (EU)

Japan
- University of the Air/National Institute of Multi Media Education

Jordan
- Al Quds Open University (in developmental stage)

Kenya
- Schools Broadcasting Service
- University of Nairobi (School of Distance Studies)

Lesotho
- English Language Radio

Malaysia
- Asia Pacific Institute for Broadcasting Development in Malaysia
- Science University (Penang)
- Universiti Sains Malaysia (USM)

Mauritius
- College of the Air

Mexico
- Autonomous National University
- Telesecundario
- Universidad Pedagogica Nacional

Nepal
- Institute of Education/Radio Education Teacher Training Programme

Nicaragua
- Radio Mathematics (also in Thailand, Bolivia, Dominican Republic, Ecuador, Honduras, and Costa Rica)

Netherlands
- Dutch Open University

New Zealand
- Massey University
- New Zealand Technical Correspondence Institute

Nigeria
- National Teachers Institute at Kaduna

Norway
- Norwegian State Institution for Distance Education (Norsk Fjernundervisning) (Nfj)
- NKI Foundation
- NKS Institute (Norsk Korrespondanseskole)

Pakistan
- Allama Iqbal Open University (AIOU)

Papua New Guinea
- University of Papua New Guinea
- Teaching Science by Radio

Philippines
- Office of Non-formal Education
- University of Life

Poland
- Agricultural Television University
- National Radio and Television University for Teachers
- Open University (proposed)
- Television Polytechnic (no longer operating)

Scotland
- Dundee College
- University of Strathclyde

Senegal
- Radio Educative Rurale

Singapore
National University of Singapore

South Africa
University of South Africa

South Korea
Korea Air and Correspondence University
Air and Correspondence High School

South Pacific region
University of the South Pacific (serves 11 islands, 1.6 million people spread over 11 million square miles of ocean) (Coldevin and Naidu, 1989)

Spain
Universidad Nacional de Educacion a Distancia (UNED)

Sri Lanka
Sri Lanka Institute of Distance Education (SLIDE)

Sweden
Hermods
Umeå University
University of Uppsala

Tasmania
Tasmanian State Institute of Technology, Launceston

Tanzania
Institute of Adult Education

Thailand
Ramkhamhaeng University
Sukhothaithammathirat Open University (STOU)

Turkey
Institute for Diffusion of Higher Education (YAKUR)

United Kingdom
Henley Management College
International Extension College
Institute for Educational Technology at the University of Surrey
National Extension College
Open University
University of London
University of Warwick

USSR
Financial and Economic Institute for Distance Education
Northern Polytechnical Distance Teaching University
Ukrainian Polytechnical Distance Teaching University
Union Polytechnical Distance Teaching University, Moscow

Union Polytechnical Distance Teaching University, Kirov
University of Moscow
University of Leningrad
University of Kharkov

Venezuela
Universidad Nacional Abierta (UNA)

West Indies
University of the West Indies

Zambia
University of Zambia

Organizations

Arab League Educational Cultural and Scientific Organization (ALECSO)

Asian Programme for Education Innovation and Development (APEID)

Capricorn Interuniversity Teleducation Programme (CITEP) (supports member universities in Argentina, Bolivia, Brazil, Chile, and Paraguay)

COMETT (Community in Education and Training for Technology) fosters cooperation between European universities and industry on training programs and issues

Commonwealth of Learning: established September 1988 to promote cooperation between member countries in the area of distance education; the governments involved have pledged to contribute 15 million pounds for the first 5 years of operation

For information, write:
Dr. James A. Maraj, President
The Commonwealth of Learning
300-800 Hornby St.
Vancouver, B. C.
V6Z 2C5 CANADA

DELTA: Developing European Learning through Technological Advance (14 million pounds to be committed); will probably include satellite links between countries

Distance Education Council of Asia (DECASIA)

Distance Learning Association, Africa (Botswana, Lesotho, and Swaziland)

EPASMUS: (European Community Action Scheme for the Mobility of University Students)
Among its projects is the PLUTO project, a computer

infrastructure that will provide member institutions, teachers, and students with e-mail and conferencing.

EuroPACE (Programme of Advanced Continuing Education in Europe)
A consortium of multi-national companies (including IBM, DEC, Hewlett-Packard, British Telecom and Thomson) that uses both satellite and CMC to deliver advanced continuing education

European Association of Distance Teaching Universities (EADTU)

EADTU is funding the development of JANUS, a telecommunications network that will provide its members with e-mail and conferencing to support course preparation, administration, and research activities.

Latin American Association of Radio Schools (ALER)

SATURN (Scientific and Technological Updating using Remote Networks)
A pan-European cooperative effort between distance teaching universities and various industries: goal is to produce more educated workers using distance teaching

For more information on SATURN or its projects, write:

SATURN
P.O. Box 564
Walton Hall
Milton Keynes, ENGLAND MK7 6DG

For more information on many of these organizations, see McLure and Heap, 1990.

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Distance Education and Graduate Study

Descriptions of the following programs vary in terms of the kind and amount of information available regarding each one. Given the variability in the original sources, this list is the most comprehensive and complete it was possible to assemble at this time. (For example, some of the programs delivered at a distance also have a residence requirement, although the specifics are not always accessible.)

It is almost impossible at this time to provide a complete list of graduate programs in the United States which are in distance education or delivered via distance education. Compared to other countries, higher education in the U. S. is very decentralized on the national level. At present, there is no central agency or clearinghouse which monitors this type of development. Regent's College in New York is preparing to establish a database which will list all the courses in the U. S. which are taught at a distance; however, this effort is only in the planning stage (M. Moore, personal communication, August 14, 1989).

Graduate Course of Study Delivered at a Distance

Boise State University (Boise, Idaho)

Degree: Master of Science degree in Instructional Technology
First offered: 1989
Description: The course of study covers:
instructional theory and design
human factors engineering
video delivery systems
instructional courseware design
artificial intelligence and simulations
Media: computer-mediated communications, print, video, computer-based training, telephone contact
Source: Admission information; (1-800-824-7017, ext. 1312)

Deakin University (Australia)

Degree: first university in the world to offer a Master's in Business Administration (MBA) entirely in the distance mode; also offers a Master's in Education and a Master's in Educational Administration
First offered: 1981
Media: uses print, interactive study guides (commentary, in-text and review questions, sample answers, readings, case studies), alsc audio and sometimes video cassettes, and extensive use of computer programs
Other: cooperating with the Australian Society of Accountants to product non-credit short courses at a distance for managers
Source: (Northcott, 1986)

Connected Education, (New York)
(Affiliated with the New School for Social Research)

Degree: Master of Arts in Media Studies; as of 1987, an online doctoral program in the philosophy of technology was in the process of development in conjunction with the Polytechnic University of New York
First offered: 1985
Description: Required courses are Media Theory, Computer Conferencing, and Thesis Tutorial
Additional courses must be taken in the following areas: Survey courses, Theory/Philosophy/ and Skills
Source: Information packet available from:
Connected Education
92 Van Cortlandt Park South
Bronx, New York 10463
212-549-6509

Electronic University Network (United States)

Degree: three MBA's
Media: e-mail and print
Source: Osgood, 1986

Henley Management College (United Kingdom)

Degree: MBA
First offered: PROPOSED; current status unknown
Media proposed: print, audio and videocassettes
Source: (Northcott, 1986)

Murdoch University (Australia)

Degree: Master's in Literature, Communications
Source: (Laverty, 1988)

National Technological University (Colorado)

Degree: Master of Science
Media: The world's first satellite university, with 22 cooperating institutions, including Georgia Tech, Purdue, and the University of Alaska.
Source: (Kirby, 1988)

Nova University (Ft. Lauderdale, Florida)

Degrees: Doctorates in Training and Learning, Information Systems, and Information Science
Master of Science in Training and Learning, Information Resource Management, Information Systems, Adult Education, Electronic Education
First offered: 1983
Description: emphasis underlying all the degrees is computer science and telecommunications
Media: print, e-mail, telephone
Source: Admission information; (305-475-7047)

Open University (United Kingdom)

Degrees: Master's in Advanced Educational and Social Research Methods, Literature Research Methods, Mathematics
Proposed degrees: Master's in Education (first presentation proposed for 1987)
Source: (Brynner, 1986)

Pennsylvania State (University Park, Pennsylvania)

Degree: Doctorate in Education with specialization in Distance Education
Media: print, audio and video teleconferencing
Source: Personal communication, Dr. Michael Moore, 8/25/89

Syracuse University (New York)

Degree: MBA, Master of Fine Arts, Master of Social Science
Source: (Laverty, 1988)

University of New England (Australia)

Degree: Master's in Curriculum Studies, Education, Educational Administration, Literature, Economics, Natural Resources, Urban and Regional Planning
Source: (Laverty, 1988)

University of Oklahoma

Degree: Master of Liberal Studies
Source: (Laverty, 1988)

University of Queensland (Australia)

Degree: Master's in Education, Educational Administration, Literature Studies in English, Local History
Source: (Laverty, 1988)

University of South Africa

Degrees: a wide range of postgraduate degrees, including doctorates
First offered: "many years" ago (Laverty, 1988)

University of Strathclyde (United Kingdom)

Degree: MBA program
First offered: 1983
Description: Strathclyde and Deakin cooperated in the development of their MBA's
Media: print, almost exclusively
Source: (Northcott, 1986)

University of Warwick (United Kingdom)

Degree: MBA
First offered: 1986
Description: the courses are designed by the University of Warwick and administered by Wolsey Hall correspondence college
Source: (Northcott, 1986)

Degrees in Distance Education Using Distance Methods

Athabasca University (Canada)

Degree: Master's in Distance Learning
First offered: PROPOSED (1988); as of May, 1990, final approval was still pending
Description: three tracks in the program:
instructional design
adult learning
systems management
The program would be available either face-to-face or at a distance.
Media: print and multi-media, including teleconferencing and computer conferencing

South Australian College of Advanced Education (Adelaide)

Degree: Graduate Diploma in Distance Education
The first qualification of its kind in Australia.
Equivalent to one year full-time study, but delivered part-time over a period of 3 years.
First offered: 1983
Description: The course of study covers 7 areas:
intro to DE
programme development
instructional design
communications technology
administration of DE
evaluation
student support
Media: primarily print-based, although it also uses audio-cassettes, video-cassettes, and color slides; reprints of articles are provided to students
Source of information: (Kirkwood, 1985)

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Educational and Communications Applications of CMC

This section is divided into three parts:

1) Charts of educational applications of CMC
2) Charts of communication applications
3) Annotations of certain entries in the charts; annotated chart items are indicated with an asterisk.

If it uses CMC for both education and communication, an organization or institution may be listed on both charts.

The purpose of this section is to provide an overview of the range of international implementations of CMC. Entries in the charts were gleaned from available literature on CMC and distance education, and personal contacts developed at conferences and through telephone conversations with the professionals involved.

These charts should be considered only a sample of existing implementations. For example, one of the most exciting developments is the use of CMC to connect elementary and secondary school students from different countries. However, to actually document each such occurrence might be a worthwhile but certainly impossible task. Accordingly, the entries should be taken as documentation of the pervasiveness of CMC as well as stimulation to further innovative applications.

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
Aarhaus Technical College	Denmark	Using PortaCOM to support distance learners
American Productivity Center	Houston, Texas	Presents seminars on productivity issues to high-level executives
Apple's Global Education Network		International telecommunications projects for schools; one project connected students in Eskimo and Arab schools
Association of European Correspondence Schools		Offers continuing professional education courses in distance education; either a certificate or diploma can be earned, depending upon the amount of study
*Athabasca University	Athabasca, Alberta	Master's program in Distance Learning with 3 tracks (approval pending)
*AT&T--Canada	Toronto, Ontario	Has worked with Athabasca University and the Canadian government to establish the Canadian Distance Learning Association
*AT&T--LDLN (Long Distance Learning Network)	275 Users in U.S., the Netherlands, Australia, Germany, Japan, Canada, France	Teachers and students are assigned to learning circles based on interest, grade, and location
AT&T--U.S. (in conjunction with Boston University, Harvard, Bell Lab, the World Bank, NYU)	U.S. to Beijing China	Care of spinal cord injuries, methods of teaching calculus, capital investment; advances in technology, educational testing/ college admissions
Austra-USA Project	Australia/U.S.	Goal of this telecommunications project is the exchange of letters, poetry, reports on local culture, and news between school
BESTNET	Network of universities in southwest U.S. and Mexico	CMC supports instructor-student interactions

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
Birmingham University	U.K.	As of 1986, NOTEPAD was being used on an experimental basis
*Boise State University	Boise, Idaho	In the Fall of 1989, BSU began offering a completely online Master's degree in Instructional Technology
BreadNet	Washington, D.C.	Network links teachers, students and associates of Middlebury College's Bread Loaf Program; activities focus on writing, literature, and theater
Brisbane College of Advanced Education	Australia	Pilot study; greater usage for student to student than student to instructor to dialog; helped reduce isolation and probably dropout
Cambridge University	United Kingdom	Began installation of a network linking computers supplied to all staff and students
*Carnegie Mellon University	Pittsburgh, Pennsylvania	According to its own studies, this University is described as "perhaps the most computer-intensive university in the world"
CECOMM (Centre for Electronic Communications and Open Support Systems in Education)	U.K.	Sponsored a course to 34 participants on educational applications of CMC
Clemson University	South Carolina	CMC used to track the problems of university computer users, to maintain a database of past problems, and notify users of solutions
*Connected Education ("Connect Ed")	U.S.	Non-credit online workshops, undergraduate and graduate courses; an online Master's is available in Media Studies; proposed doctorate
Correspondence School	Sydney, Australia	Exploring the use of e-mail to reduce turnaround time in providing feedback on assignments; target population: 7 year olds studying at a distance

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
*Deakin University	Victoria, Australia	E-mail is used in Deakin's Graduate Diploma in Computing
DoDDS (Department of Defense Dependents Schools)	U.S.	International telecommunication projects include simulations, distance learning, and staff development
Dutch Open University	The Netherlands	Experimented with an information science course taught via e-mail
Earth Lab	New York City, New York	A local area computer network designed to support collaborative work among 6th grade students and teachers (researched by Bank Street College and BBN Laboratories)
Electronic University	Norway	Cooperating with the Electronic University (San Francisco) to offer classes from 16 universities in the U.S.
*Electronic University Network	U.S.	Various universities offer credit and noncredit courses through the network
Empire State College	New York State	Evaluated the use of CMC in the delivery of a course, Contemporary American Diplomacy
EuroPACE	Europe	A cooperative project between business and universities which distributes educational programs on technology by satellite, supported by CMC
Fielding Institute	Santa Barbara, California	Used for student support, communication with faculty, and administrative matters
FrEdMail	U.S., Argentina, Puerto Rico, Australia, Argentina	Teachers, administrators, and students participate in large groups with open admission or smaller groups by request

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
Hawaii Global TELEclass Program	University of Hawaii	Uses CMC, audio teleconferencing, and slow scan television to link high school students in cooperative learning projects
*Houston Community College	Houston, Texas	Offers a series of "modem classes"
ICLN (Intercultural Learning Network)		Created to study instructional networking; participants include students and teachers from elementary and secondary, undergraduate and graduate institutions in the U.S., Mexico, Tokyo, and Israel
IRIS	U.S.	An educational network supporting teacher development, student projects, and e-mail
ITT Dialcom System	Ohio State University	Used e-mail in a pilot study of an adult and vocational education program; 16 sites studied over a 3 month period in 1983
*Jutland Open University (JOU)	Denmark	Starting in 1988, JOU began PICNIC (Project in Computer Networks in Distance Education Curricula)
Kids Network	U.S.	Four thousand children at 200 sites participated in a project including data-collection on acid-rain; funded by National Geographic, the National Science Foundation, and Apple Computer
McGill University	Montreal, Quebec	In 1987, McGill offered a course to a group of Baffin Island teachers; in 1988, a computer science course was offered to teachers in the Gaspe, northern Quebec, and the Northwest Territories

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
McGraw-Hill Information Exchange System	U.S.	Received approval from the USSR to include its Pioneer Palace School children in international computer conferencing nets; also has various computer conferences available by subscription
McGraw Hill Mix	2,000 subscribers in U.S., Mexico, Canada, Puerto Rico, Japan	60-70 conferences for teachers and school administrators
Montgomery College: Extended Learning Services	Rockville, Maryland	Offering 1 course each in Health and American History using CMC
*National Technological University (NTU)	Colorado	Faculty interact with students by telephone,e-mail, and teleconferencing
National University Teleconference Network (NUTN)	U.S.	Formed in 1982 by 66 universities and the Smithsonian; offers courses to national audiences
*New Jersey Institute of Technology	U.S.	One of the American leaders in the use of CMC to deliver courses
New School for Social Research	New York, New York	Offered their first course via conferencing in Oct. 1985; by spring 1986, the number of courses was increased to 10
*New York Institute of Technology	U.S.	One of the American leaders in the use of CMC to deliver courses
NKI	Norway	Developed their own software, EKKO, in 1986; currently experimenting with its usage in distance education courses
*NKS College	Oslo, Norway	Used PortaCOM to teach a computer course; expanded offerings planned for fall 1989
Northwestern University	U.S.	Students in a large lecture class on political science (170 enrolled) had e-mail access to the professor for questions/ comments)

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
*Nova University	Ft. Lauderdale, Florida	Offers several master's and doctoral programs in computer-related fields using online instruction
NY/Moscow Telecommunications Project	U.S/U.S.S.R.	The project connects 10 schools each in New York and the USSR; the focus is on problem-solving, particularly in math and science
*Ontario Institute for Studies in Education	Toronto, Ontario	Some graduate courses taught using this medium
*Open University	Milton Keynes, England	Used in a class with 1364 students; planning for upper division and more lower division use, as well as use by the Open Business School within its MBA program
Pennsylvania State University	University Park, Pennsylvania	At least two courses taught using CMC (primarily e-mail)
Pitzer College	U.S.	Used as an adjunct to two face-to-face classes, Introductin to Linguistics and Computers as Tools
Project Orillas	Mexica, Argentina, Puerto Rico, U.S.	Goal is to promote Spanish language literacy for bilingual and foreign language students
Riverdale Collegiate Institute	Toronto, Ontario	Conducts "Writer in Electronic Residence"projects linking elementary and secondary students in Canada, Iceland, Finland, and Israel
SchoolLink		Uses science and social studies projects to create global classrooms
Simon Fraser University	British Columbia	A science course to be delivered with CMC is in the development stages; delivered an education course with e-mail in Fall 1985
South Australian College of Advanced Education	Australia	Offers a Graduate Diploma in Distance Education; offered in the distance mode to any student

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
Star Schools Project	Japan, West Germany, Italy, the USSR, and the Virgin Islands	Classes share the results of math and science projects focusing on radon, weather, and polling; conducted by TERC under a Department of Education grant
State University of New York	Albany, New York	Uses conferencing to support faculty and student work
*Syracuse University	Syracuse, New York	PARTI will be used to field test CMC for delivery of a course, Community and Adult Education; conducted a short conference between students at Syracuse and the Universities of Twente (Holland)
Te'le'-Universite'	Quebec	Is planning to introduce an e-mail and CMC component into some of its courses on computing and information technology
The Pluto Project	Europe	Purpose is to explore curricular applications of CMC; classes in different countries will gather and share data on weather, pollution in rivers and so on
*Thomas A. Edison State University	New Jersey	E-mail and bulletin-boards are used to deliver a wide range of courses
TWICS	Japan	An international net operated in cooperation with a private English language school; information is primarily entered in English but some is delivered in Japanese
*University of Arizona	U.S.	Some faculty are considering the incorporation of computer conferencing into a few Spring 1987 classes
*University of California	San Diego, California	Multiple experiments on various aspects of CMC with children and college students
*University of Guelph	Guelph, Ontario	Developed CoSy, one of the leading CMC software packages; the three user groups on campus are academics, administrators, and library personnel

EDUCATIONAL USES OF CMC

Organization	Location	Implementation (Courses)
University of Michigan, School of Education	U.S.	High school students in the U.S. use CMC to role play scenarios of current political and socioeconomic importance
Univeristy of Paris-Dauphine	France	CMC is used in some courses
University of Phoenix	Phoenix, Arizona	Is planning to offer an online MBA
University of Quebec	Quebec	Runs a publically available database and bulletin board service which has an e-mail component
University of Saskatchewan	Saskatatoon, Saskatchewan	Used for assignment submission in a Sociology 110 course
University of Strathclyde	U.K.	Graduate students established a conference on "New Publishing Ventures"; the conference proceedings were published as an electronic journal
University of Victoria	Victoria, British Columbia	Used for student-instructor and student-student interaction in the Certificate Program in Computer-Based Information Systems
University of the Virgin Islands	St. Thomas/St. Croix	CMC will be used for online "importing" of faculty \and educational resources from a mainland university (planned)
*University of the World	La Jolla, California	An international educational and research net designed to connect universities around the world
*Western Behavioral Sciences Institute	La Jolla, California	Current: International Executive Forum; Planning stages: corporate colleges

COMMUNICATION USES OF CMC

Organization	Location	Communication
ACSNET	Australia	The main network in Australia; its purpose is to connect research, academic, and industry users
*Arkleton Trust	Scotland	Used in various local research efforts
ARPANET	U.S.	Named after DARPA (Defense Advanced Research Projects Agency); facilitates research sharing and collaboration; also a testbed for new developments in networking; begun in 1969
*Athabasca University	Athabasca, Alberta	Used primarily for internal communication
AUSEAnet	Australia, Thailand, Indonesia, Malaysia, Singapore, Brunei, and the Philippines)	The metanetwork for a joint microelectronics project among ASEAN (Association for South East Asian) counties and Australia
BERNET	West Germany	The largest research network in Germany
BitNet (Because It's Time NETwork) (recently renamed CREN)	Begun in the U.S. in 1981; other constituents now include Canada's NetNorth, Europe's EARN, and Japan's AsiaNet	Used by academics and researchers for professional communication (links 350 mainframes at over 100 U.S. institutions)
BLEND (Birmingham and Loughborough Electronic Network Development)	U.K.	Purpose was to study the problems in establishing electronic communities of computer specialists, psychologists, ergonomists, library schools and the Guild of Airline Pilots and Navigators
Boeing Computer Services	U.S.	Conferencing used to support a company-wide technology transfer program

COMMUNICATION USES OF CMC

Organization	Location	Communication
BOSTID (Board on Science and Technology for International Development)	U.S.	Panelists, staff, and advisors are using CoSy to continue professional discussions on African economic development begun in Nairobi; the conference will expand as more African participants come online
Boston Museum of Science	Boston, Massachusetts	Two groups of teen-agers in Boston and Geneva, Switzerland played a conflict resolution game, The Other Side
BYTE Magazine	U.S.	Uses CoSy for its information exchange (BIX)
California State Assembly	U.S.	A subcommittee has established a computer network to allow constituents a voice concerning telecommunications legislation
CANADANET (CDNNET)	Canada	Effort to establish a nationwide net for Canadian researchers
Canadian Union of Public Employees	Canada	Developed SoliNet for bargaining support, grievance tracking, support for strikes and research, and journalism (labor news available online)
*Carnegie Mellon University	Pittsburgh, PA	According to its own studies, this university is described as "perhaps the most computer-intensive university in the world"
CDNnet	Canada	Used by Candian educators, as well as those engaged in research and development
Chiefs of Police	U.S.	A computer net links police chiefs with criminal justice researchers and other experts in law enforcement

COMMUNICATION USES OF CMC

Organization	Location	Communication
*CHIMO	Mississauga, Ontario	Managed by the Peel Board of Education for teachers and students in the region and beyond
CHYMNET	U.S.	CONFER is used to connect high school and college chemistry teachers, both nationally and locally
COGNET	U.S.	A network for scientists in linguistics and psychology
CompuServe	U.S.	In addition to conferences and e-mail communication, subscribers have online access to an Associated Press news service, airline reservations, home shopping, banking services, and games
COMSEC	Originally New Jersey; now extended to out-of-state participants	This teachers' net facilitates the sharing of common concerns, resources, and ideas
Continental Bank	U.S.	More than 1,000 employees are linked by e-mail
COSAC (Communications Sans Connections)	France	A French research network begun in 1981
Cote d' Ivoire	Africa	IBM-Europe is funding a link from the Cote d' Ivoire to the European EARN network
CPPNW (Canadian Physicians for the Prevention of Nuclear War)	Canada	Uses CoSy for information-sharing and social activism
CRAT/ARCT (African Regional Centre for Technology)	Senegal	Has established a food technology network initially linking five institutions in Cameroon, Morocco, Nigeria, Senegal, and Kenya

COMMUNICATION USES OF CMC

Organization	Location	Communication
CSNet	U.S./Canada, with links to Australia, France, Germany, Israel, Japan, Korea, Sweden, and the U.K.	A network for computer scientists and those engaged in advanced science and engineering; began in 1981 with funding from the National Science Foundation
DETN (Distance Education and Training Chapter of NSPI)	U.S.	Chapter of the National Society for Performance and Instruction; CMC is used for communication and networking
DFN (Deutsches Forschungsnetz) (the German research net)	Germany	Used by academics and researchers for professional communication
Digital Equipment Corporation (DEC)	U.S.	Designing both hardware and software for CMC; currently, 50,000 DEC personnel participate in over 4,000 informal conferences; maintains an internal engineering network called EasyNet
(DISC) Disabled Information Services of Canada	Canada	Network for the exchange of ideas, articles, and messages
DRENET	Canada	A military network similar to and linked to ARPANET
EARN	Europe	The European Academic Research Network, linking over 100 mainframe computers and 100 institutions in 18 countries
EcoNet		Facilitates communication among an international membership
*EDAN	Ontario, Canada	Pilot project funded by TV Ontario to establish conferences for organizations, educators, and students

COMMUNICATION USES OF CMC

Organization	Location	Communication
EUnet	Originally linked the U.K., the Netherlands, Denmark, and Sweden	The European UNIX network. Purpose is to provide users with electronic communications and online news
EuroCOM	Europe	Used by dispersed communities of scientists and information workers (available to participants in the EEC ESPIRIT program)
EXXON	U.S.	EXNET links 240 organizational development specialists around the world
GCOM Gaeltachta Authority	Ireland	CoSy translated into Gaelic; used to preserve and teach the Gaelic language
Gemological Institute of America	California	Online training in gemology
GENET	U.S.	A network for geneticists
Geshernet	Israel	CMC links Israeli participants with the international Jewish community
*Greenpeace		Connects 400 professionals around the world
Harvard University Educational Technology Center	Boston, Massachusetts	Ran a network for 75 secondary science teachers in Massachusetts
Hewlett-Packard	U.S.	Conferencing used by engineering and marketing units for information sharing and project management
*Institute for the Future	Menlo Park, California	One of the earliest and most creative users; conducted considerable empirical research
Institute of Nuclear Power Operators	U.S.	Notepad is used to connect each utility with consultants, vendors, and other relevant organizations

COMMUNICATION USES OF CMC

Organization	Location	Communication
Instrument Society of America	U.S.	Used conferencing to develop standards
*International Council for Distance Education	Oslo, Norway	Plans to establish computer networks to connect its regional organizations
International Development Research Center	Ottawa	Held an open 8 month online conference with more than 100 researchers from various countries
IPPNW (International Physicians for the Prevention of Nuclear War)		CMC used to facilitate communication between busy professionals in geographically dispersed regions; active on PeaceNet and CoSy
International Research Cooperation	U.S. and the Soviet Union	Joint research venture on the uses of computers in education
JANET (Joint Academic Network)	U.K.	Designed to connect universities and research institutions in the U.K. with each other and to provide access to international nets
JEDEC committee of IEEE (Joint Electron Device Engineering Council)	U.S.	Used conferencing to develop standards for a new integrated circuit
Johnson's Wax	U.S.	Uses conferencing for information exchange among 160 marketing managers around the world
JUNET	Japan	As of 1986, the major nationwide non-commercial computer network for both research and cooperative exchange among users
KUON-TV (PBS station)	University of Nebraska, Lincoln	Managing 15 conferences exploring uses of new technologies for PBS stations

COMMUNICATION USES OF CMC

Organization	Location	Communication
*MARIS-NET	United Kingdom	A database of open learning materials available in the U.K.
MARYNET	Maryland	Serves as an informal resource exchange for educators, students, and parents interested in educational applications of microcomputers
MFENET	U.S.	Connects physicists doing research in nuclear fusion, particularly in Magnetic Fusion Energy (MFE)
MILNET	U.S.	A production military network
Ministry of Natural Resources	Toronto, Ontario	Uses CMC to distribute updated information on water conservation
NetNorth	Canada	Links 90 host computers at 20 Canadian universities and research sites;connects to BitNet and EARN
*New York Institute of Technology	U.S.	Conferences used to connect teachers, Teacher Resource Centers, and to facilitate grant writing and publishing
New York Youth Network	New York City	Social service and educational networking by primarily black and Hispanic youth
NSFNET	U.S.	Supported by the National Science Foundation; the net is used to access supercomputers, libraries, and satellite data, as well as to link researchers and scholars
NITEC Network (National Information Technology in Education Centre)	Ireland	The network is designed to facilitate professional collaboration and the introduction of information technologies into local schools
OCEAN	U.S.	A network for oceanographers

COMMUNICATION USES OF CMC

Organization	Location	Communication
*Office of Educational Communications of the Association of Atlantic Universities	Halifax, Nova Scotia	Studied communication pattens of two interuniversity computer nets in Canada (Netnorth/Bitnet and CDNnet)
*Online Journal of Distance Education and Communication	University of Alaska	A "publication" which is only available online
*Ontario Institute for Studies in Education	Toronto, Ontario	Uses its own Online Educators Network; will be expanded by December 1988 to make it accessible on an international basis. Coordinates a Latin American Educational Research Network
*Open Learning Agency	Vancouver, British Columbia	Used to connect 250 tutors; all should be online within two years
PeaceNet		Facilitates communication among an international membership
Pennsylvania State University	University Park, Pennsylvania	Michael Moore, editor of the American Journal of Distance Education, is planning a special net for up to 50 selected DE specialists; purpose is to work together on specific problem areas
Pilnet (Personal Information for Living Network)	U.K.	Thirty regular contributors will evaluate: a) the impact of information technologies on public access to information (including implications for training); b) value of an electronic net for inter-institutional research cooperation
Project CUE	Canada	Seeking ways to make CMC accessible to those currently disenfranchised; exploring cost-effective ways of linking regional networks to national and international nets

COMMUNICATION USES OF CMC

Organization	Location	Communication
PROPHET	U.S.	A network for medical researchers
PTL - Telematics	Helsinki, Finland	(like Bell Telephone, only in Finland); plans to have a commercial service
Public Electronic Network (PEN)	Santa Monica, California	Provides residents with e-mail access to city offices
Queens Overall Economic Development Corporation	New York, New York	Uses conferencing to provide businesses with information regarding sources of financing and new market options; Available to customers, using hired moderators
*Rappi Project		Host varies on an annual basis; Connects 75 schools across Canada and Europe
*Rochester Institute of Technology	Rochester, New York	Uses CMC for purposes of communication and instructional delivery
ROSE (Research Open Systems for Europe)	Europe	(In progress) Goal is to provide a network infrastructure for collaborative research and development within ESPRIT (the European Strategic Program in Information Technology) of the European Economic Commission (EEC)
Rurtel Network	Scotland	Used by rural groups for online management activities, to increase access to services, and improve educational quality and access
SCIENCEnet	U.S.	An interdisciplinary net for scientists
SDN	Korea	Purpose is to facilitate computer communications and resource sharing, as well as to provide a test environment for research and development

COMMUNICATION USES OF CMC

Organization	Location	Communication
SeniorNet	U.S. and Canada	Used for individual and group activities ranging from newsletter production to online forum participation
Simon Fraser University	Burnaby, British Columbia	Uses Forum for faculty networking and teacher training
SkolCOM	Sweden	A new conferencing system being piloting for teachers and teacher trainees; purpose is to facilitate communication regarding educational development and information technologies
SPAN (Space Physics Analysis Network)	U.S./Europe	Begun in 1980, SPAN is used by researchers in Solar Terrestrial and Interplanetary Physics, as well as for data comparison and collaboration between NASA and the European Space Agency
Sulawesi Regional Development Project	Indonesia/Canada	CMC used to maintain daily contact between Indonesian and Canadian staff
SUPERNET	Europe	Universities and industries from 6 European countries participate in this computer network for distance teaching; goals are market development and refinement of distance teaching methods
Surfnet	The Netherlands	The Dutch National Research Network
*Syracuse University	Syracuse, New York	Conducts several topical discussions on a net; graduate students in adult education have an electronic journal; SeniorNet connects seniors and provides access to some services

COMMUNICATION USES OF CMC

Organization	Location	Communication
Telehouses	Denmark, Sweden, Norway	Networks of "electronic village halls" facilitating self-help and community management
TELENET	U.S.	Public data network
Te'le'-Universite'	Montreal, Quebec	Used for internal communication; also translating CoSy into French
Texas Instruments	U.S.- based	More than 8,000 terminals in their worldwide network handle 4 million messages annually
The Source	U.S.	In additon to conferences and e-mail communication, subscribers have online access to United Press International, business and financial news, and home shopping
Toshiba	Tokyo, Japan	Project management
TYMNET	U.S.	Public data network
United Nations University (Tokyo) and the International Development Research Centre (Ottawa)		CMC used to connect Latin American and Canadian scientists engaged in Brucellosis research
*University of Arizona		Used in approximately 35% of the administrative units on campus (with over 400 users)
*University of Guelph	Guelph, Ontario	CoSy developed one of the leading CMC software packages; the three main user groups on campus are academics, administrators, and library personnel
University of Maryland	Baltimore	Used CoSy to connect community-based pharmacists with the pharmacy faculty
University of Phoenix	Phoenix, Arizona	Plans to develop an online MBA program

COMMUNICATION USES OF CMC

Organization	Location	Communication
University of Regina	Regina, Saskatchewan	Recently installed MLNET, the basis of a local electronic network
U.S. Army	U.S.	The Army maintains approximately 1500 user IDs and runs about 3 dozen conferences
U.S. House of Representatives	Washington, D.C.	Subcommittee on Science and Technology and a group of scientists used conferencing to discuss the development of a national science policy
VNET	U.S.; nodes also found in North and South America, Africa, the Middle East, Europe, Australia, and Asia	IBM's company network
Welsh National Library	Wales	Used to plan a genetics conference; CMC is also used to facilitate communication between authors and publishers
*Western Behavioral Sciences Institute	La Jolla, CA	Current: World Economic Forum Phoenix Future's Forum: Planning for work with: Chase Manhattan Bank
White House Conference on Library and Information Science	Washington, D.C.	Conferencing was used to plan this 1978-1979 conference
White House Conference on Productivity	Washington, D.C.	In 1983, 200 executive vice-presidents from Fortune 500 companies, 60 CEOs and several major labor unions used CMC to plan for the conference

Other U.S. Organizations or Corporations using Computer-Mediated Communications*

**NOTE: Most of the information under this final heading was obtained from:*

Hughes, C., Cook, G., & McGrath, J. (1987). A survey of computer mediated communciations: Computer conferencing comes of age. (Available from The Gartner Group, 56 Top Gallant Road, P.O. Box 10212, Stamford, CT, 06904).

Association of Professional Data Uses
Bechtel
Citicorp
Continuing Education Division of the New Jersey Institute of Technology
Department of Commerce, State of Michigan
Digital Equipment Corporation
E.I. DuPont
Flow General
Georgia Tech
Honeywell Avionics
Kellogg Foundation National Fellow Program
IBM
Kodak
Mott Foundation Community Education Programs
NASA
Northern Telecom
Prime Computer
Proctor & Gamble
Salk Institute
Society of Motion Pictures and Television Engineers
University of California, Berkeley
U.S. Department of Energy
U.S. Department of Interior
U.S. Environmental Protection Agency

Annotation for Charts on Education and Communication

AT&T Canada

In conjunction with Athabasca University and the Canadian government, AT&T Canada has developed the Canadian Distance Learning Development Association (CDLDA). Its purpose is to coordinate with companies and other universities on distance projects. Their first international client is the University of Thailand (with 1/2 million students).

They have also bid for the Canadian Armed Forces course package. If their bid is successful, the CDLDA would be responsible for converting residence material for on-site delivery via CBI and conferencing. (This same combination of media will be used in the Thai venture, although the specific course content has yet to be determined.)

AT&T U.S.

AT&T is being partially funded by the Economic Trade Fund of the State Department to provide interactive CMC instruction to Beijing Normal University.

Hardware and software costs are about $10,000 per station. Hardware supplied by Optel Communications. The communication link costs only $1.00 per minute.

The synchronous interaction utilizes videographics, an audio connection, video cameras attached to create computer images from live objects, and color graphics which can be stored then annotated at a later time.

Course Providers	Courses Offered
Boston University Medical School	treating spinal cord injuries
Harvard	comparative methods of teaching advance calculus
World Bank	capital investment
Bell Lab	advances in technology
NYU	educational testing and college admissions

Future courses and providers are scheduled to include: English language courses (offered by UCLA) and neonatal care (to be delivered to African nations by Johns Hopkins).

Arkleton Trust (Scotland)

CoSy is used by this nonprofit rural development organization to communicate with its own researchers as well as to assist nonprofit organizations in Scotland. Some of the latter include:

Gaelic preservation organizations, the Orkney bird preservation researchers, and small cottage industries.

Athabasca University (Athabasca, Alberta)

Master's: The university is working toward developing a Master's program in Distance Learning with 3 tracks: instructional design, adult learning, and systems management. The courses will utilize a variety of media, including print, teleconferencing and computer conferencing. Implementation of the degree program is contingent upon approval by the Canadian government.

Researchers at Athabasca are developing an instrument to predict completion based on a student's "presenting characteristics" (expectations, time available for study, place student will study in the home etc). For students who load high on identified factors, prediction of completion is 100%. In other cases, predictive ability drops to 70%. Pilot studies are planned at other universities (Coldeway, personal communication, Nov. 3, 1988).

Boise State University (Boise, Idaho)

Degree: Master of Science degree in Education with emphasis on Instructional Technology;
First offered: 1989
Course of study:
instructional theory and design
human factors engineering
video delivery systems
instructional courseware design
artificial intelligence and simulations
Media: print, video, computer-mediated conferencing, computer-based training, telephone contact, and live instruction
Admission information; (1-800-824-7017, ext. 1312)

Connected Education (U.S.)

Connected Education uses the EIES computer conferencing system. The program is accessible through any microcomputer or terminal and modem. Specific features designed for Connect Ed are an online library, a book-ordering service, and an online cafe for informal dialogue.

Courses are available for graduate or undergraduate credit, or non-credit audit. The duration of most courses is two months.

Graduate tuition is $1,008 plus a $60 registration fee for a three credit course. This charge covers all computer operating and connection fees, except the cost of local telephone calls to connect to the system.

Visitors are allowed to browse around the online campus, tour the library and online cafe for $30 a month access charges, plus

the following hourly rates: 6 pm - 7 am ($12); 7 am - 6 pm weekends ($16); 7 am - 6 pm weekdays ($25).

Carnegie Mellon University (U.S.)

Various researchers at Carnegie Mellon are actively engaged in experimenting on various aspects of CMC, primarily synchronous CMC. For a list of abstracts, write the Committee on Social Science Research in Computing.

CHIMO (Canada)

The word, "chimo", is a North Eskimo greeting as well as the name of a Canadian network. It is managed by the Peel Board of Education, funded by Northern Telecom, and uses a host computer system provided by Unisys Canada.

CHIMO is designed both for research and communication; the net has the capacity for open, restricted, and structured conferences, online guests, student "key-pals", and so on.

Registration fees for 1988-1989 vary, depending upon the number of logons:

0-5 logons	$100
5-10 logons	$150
11-20 logons	$200

Long distance calls via iNET are approximately $7 an hour from any location in Canada.

Deakin University (Victoria, Australia)

Deakin is one of thirty or more higher educational instutitions in Australia which caters to distance education students. It is a dual mode university, i.e. it offers both distance and campus classes. Deakin was founded in 1977, and as of 1986, had 6,000 students. Of these, 60% were studying at a distance. The courses are primarily print-based, with additional use of audio and videocassettes.

EDAN (Canada)

The first field trial for this network began in January 1987, with seventy-five sites in Ontario, Canada. By the end of 1987, the number of sites will have increased to over 110. Three basic types of conferences were proposed: organizational (to facilitate strategic discussion and planning); educator-based (for Ministry personnel and teachers); and student-based (to facilitate communication and cooperation on research projects).

If the project is successful, a considerably larger CMC network may be considered. The proposed network might connect the 5000 or more elementary and secondary schools, colleges, universities, and other educational institutions in Ontario.

Electronic University Network (U.S)

TeleLearning's Electronic University Network is an electronic medium and resource center which offers online delivery of courses designed by various colleges and universities. It began offering accredited courses in March 1984. Over 17,000 students have enrolled (Osgood, 1986).

Students have various degree options, (two associate degrees, two bachelor's degrees, three MBAs, and specialized certificates for professionals). The degrees are awarded by Thomas A. Edison State College in Trenton, New Jersey, City University in Bellevue, Washington, and John F. Kennedy University in Orinda, California.

As of 1986, undergraduate tuition was $180 per course, while graduate tuition was $200 per course. These fees include connect time.

For more information, write or call:
TeleLearning
505 Beach St.
San Francisco, CA 94133
(800)22LEARN

Greenpeace

The e-mail and CMC capabilities allow swift communication across international time zones, facilitating a timely response as well as the development and maintenance of consistent policies. For example, the organization may learn that it is supporting the use of gill nets in one part of the world and protesting usage in another area.

Houston Community College (HCC) (U.S.)

HCC currently offers several "modem courses", in which professors electronically deliver their lectures and transmit graded homework to students. HCC plans to have a full complement of modem courses available by January 1989.

For information regarding the preparation of modem parties, send a blank diskette and self-addressed envelope to:

Dr. Roger Boston
Data Processing Division
Houston Community College
4310 Dunleavy
Room 109
Houston, TX 77006
Phone: 713-868-0779

Institute for the Future (Menlo Park, California)

Funding for the CMC work: National Science Foundation

The IFF was one of the earliest researchers of computer conferencing. It is a non-profit research organization whose staff include Jacques Vallee, Robert Johansen, Richard Miller, and Hubert Lipinski.

International Council for Distance Education (ICDE)

Formerly, the International Council for Correspondence Education (ICCE), the ICDE has established its permanent secretariat in Oslo, Norway. The ICDE is exploring the feasibility of using CMC to facilitate communication among its many regional members (for example, the Canadian Association for Distance Education, and the Australian and South Pacific External Studies Association etc).

Information on the ICDE may be obtained from:

Secretary General
International Council for Distance Education
P.O. Box 2100
Grünerløkka
N-0505 Oslo 5, Norway

Jutland Open University (JOU) (Denmark)

The JOU is a cooperative educational venture between the University of Aarhus, the University of Aalborg, and South Jutland University Centre. Since 1983, JOU has been experimenting with the COM conferencing system, but switched to PortaCOM in 1987.

MARIS-NET (United Kingdom)
(Materials and Resources Information Service Network)

MARIS-NET is an electronic database which covers three basic areas of distance education:

a. approximately 8,000 packages of self study materials, including information on subject, content, availability, target audience, cost, and media used.
b. organizations and services, including information on suppliers, as well as those who are able to assist in instructional design of material.
c. Bibliography of open learning opportunities.

MARIS-NET is available through subscription.

NKS College (Oslo, Norway)

After the successful implementation of a course, "Computer as a Tool", offered through the business program, NKS plans to continue its CMC experiments in the fall of 1989 with courses in

three areas: Business and Management studies, Computer studies, and informal continuing education courses.

National Technological University (NTU) (Colorado)

NTU offers distance courses towards Master's degrees for engineers, scientists, and technical managers and delivers them to the students work sites. By 1990, NTU is projected to become the largest sole source of Master's in Engineering courses in the U.S. While most courses are delivered by videotape, CMC is one technology used to maintain contact between students and instructors (Bacsich, Kaye, and Lefrere, 1986).

New Jersey Institute of Technology (U.S.)

A wide range of continuing education courses are conducted with EIES, including courses in business, computer programming, and technical writing. NJIT is also a site of considerable experimentation with CMC.

New York Institute of Technology (U.S.)

NYIT uses CMC for various courses for credit as well as workshops on professional development.

Specific conferences:

a. a conference for 100 English teachers in U.S. and Canada; purpose was to discuss use of computers to teach writing, software design, teaching strategies
b. a conference for Teacher Resource Centers funded by the NY State Education Dept. Purpose is to discuss teacher training, development of curriculum, and classroom exercises

Nova University (U. S.)

Degrees offered:

a. Doctor of Arts in Information Systems
b. Doctor of Arts in Training and Learning
c. Doctor of Education in Computer Education
d. Doctor of Arts in Information Science

Office of Educational Communications of Atlantic Canada

Sixteen postsecondary institutions were studied in an attempt to ascertain current patterns of usage so that future interuniversity networks could be developed. Objects of study included current and potential users, training and service needs for users, and hardware/software considerations as the nets are expanded.

Online Journal of Distance Education and Communication (U.S.)

This free "publication" is only available electronically. It may be accessed through BitNet or related networks (EARN, JANET, NETNORTH, ACSNET, and others). Subscribe online by sending the following interactive command to:

LISTERV@UWAWM:
SUBSCRIBE DISTED your name

Or, contact the editor:

Jason Ohler
BitNet ID; JFJBO@ALASKA
Educational Technology Program
University of Alaska
11120 Glacier Highway
Juneau, Alaska 99801

Ontario Institute for Studies in Education (Canada)

OISE is the graduate school of education affiliated with the University of Toronto. ConnectEd (U.S.) and OISE were among the very first to offer online graduate courses. In addition to courses, some faculty members use CMC to supervise dissertations, which provides faster feedback to students without trying to coordinate schedules for face-to-face appointments.

Some OISE conferences are moderated by students, including a conference designed to provide mutual assistance during preparation for comprehensive exams.

OISE expects to have an online version of its catalog by 1990.

Since 1985, OISE has conducted a number of activities using PARTICIPATE, including an International On-line Educational *Research Workshop, coordinating a Latin American* Educational Research Network, a Canadian 'small schools' network, and online professional development for teachers in the province.

Open Learning Agency (OLA) (Vancouver B.C.)

The immediate goal of the OLA is to get all their 250 DE tutors on-line for communications purposes. The first 10 tutors are scheduled to be on-line before the end of November 1988; the rest will be included within 2 years.

Eventually, OLA plans to add a CMC component (either e-mail or conferencing or both) to most of its courses. At present, their courses are primarily print-based with cable TV.

Rappi Project (Canada/Europe)

Rappi (Réseay Pédagogiques Pilote International), originated at the Versailles economic summit in 1982. The project is an

electronic network which links 75 schools in Canada and Europe (particularly Italy and France) (Harasim, 1988b). The purpose is to facilitate communication and information-sharing on the part of students and teachers in the participant countries.

Rochester Institute of Technology (U.S.)

The CMC system uses micros to connect to VAX communications for the purpose of accessing communications, mail, and conferencing software, as well as access to external databases, electronic blackboards, on-line catalogs, and videodisc archives.

Syracuse University (U.S.)

Various electronic conferences are hosted by Syracuse, including electronic communications and adult educators, women in adult education, literacy, gerontology, and international issues in adult education.

Syracuse also has a SeniorNet, that links seniors throughout the country. The following services are available through CMC: electronic mail, conferencing, bulletin boards, electronic shopping and banking, retrieval of information.

Thomas A. Edison State College (New Jersey)

The College is now in its third year of involvement with CMC. The first two involved software development with the assistance of the New Jersey Educational Computer Network, a consortium. CMC is primarily used to facilitate communication and increase student motivation by reducing isolation some of the isolation characteristic of the distance student.

University of Arizona

Approximately 35% of all administrative units have at least one representative on CoSy, while some colleges, departments, and administrative offices have their entire complement of staff/faculty on the system.

A pilot course was developed to acquaint faculty with the system and its educational potential. Two instructors planned to use CoSy as an "adjunct" to their courses in spring 1987.

University of California (San Diego)

Projects include:

a. Computer Chronicles Newswire: a computer-supported writing system and cooperative problem-solving network modeled on the international wires for newspapers; students selected stories then downloaded, wrote, and produced their own newspaper. Initial efforts included five schools located in California and Alaska.

b. An alternate version of the Newswire was developed for students with learning difficulties. These participants engaged in group learning activities in reading, writing, math, and memory.

c. An InterCultural Learning Network includes various classes from 200 schools in numerous countries. The project is underwritten in part by National Geographic and the National Science Foundation.

University of Guelph (Guelph, Ontario)

Faculty, staff, and students at the University of Guelph are among the most active users in the world. The university developed and holds the licensing rights to CoSy, one of the major conferencing software systems. In addition, one department, the Department of Rural Extension Studies, is actively engaged in exploring ways CMC can be used to facilitate development efforts in third world countries.

University of the World

Incorporated in 1983, the organization is developing plans to use audio, computers, and other instructional technologies to develop an international education and research network. The subscription fee to the University includes a BITNET e-mail node, if the subscriber is not already online. The node is valued at $8000 U.S.

Address: The University of the World
1055 Torrey Pines Road, Suite 203
La Jolla, California 92037
Telephone: (619)-456-0103
Facsimile: (619)-454-3206
BitNet: Miller@SDSC

Western Behavioral Sciences Institute (WBSI) (U.S.)

WBSI is actively engaged in exploring new uses for CMC, including:

International Executive Forum, formerly School of Management and Strategic Study. It consists of 2 components:
a. a global dialogue, in which participants learn about countries with the guidance of local experts
b. CEO: top level execs

World Economic(Geneva)
CMC is being used to support economic summit meetings.

Phoenix Future's Forum: a computer conference designed to strategize about the city's future

Information on Computer Conferencing

Overview of Conferencing Software

This section consists of two parts:

1) A chart detailing the attributes of various conferencing systems

   ** The charts are reproduced by permission from:

   Hughes, C., Cook, G., & McGrath, J. (1987). A survey of computer-mediated communications: Computer conferencing comes of age. (Available from The Gartner Group, 56 Top Gallant Road, P.O. Box 10212, Stamford, CT, 06904).

2) Addresses for vendors of the major conferencing systems

CONFERENCING SYSTEMS

FEATURES	NJIT EIES 1	NJIT EIES 2	NETI PARTICIPATE	DEC VAX NOTES	ADVERTEL CONFER	DC META CAUCUS	INFOMEDIA NOTEPAD	Public Service Mail & Conferencing: ITT DIALCOM	Public Service Mail & Conferencing: STC THE SOURCE
Hardware	Perkin Elmer	IBM or VAX or 3 B Ser	IBM, DEC Prime	Micro Vax and "VAXEN"	IBM 370 Architechture	PC AT, VAX Prime, IBM	DEC 20	50 Series Prime	50 Series Prime
Operating System (Unix, VM, MVS, VMS)	Proprietary	Unix or VM	VM, VMS, & Primos	VMS	Proprietary (MTS)	Xenix, Unix, Primos, VM, VMS	Proprietary	Proprietary (Primos)	Proprietary (Primos)
X.400		*	○	●				●	
TTY Support	●	○	●	●	●	●	●	●	●
Line Editor	●	○	●	●	●	●	●	●	●
Full Screen Editor		*		●			●		
Help Facility	●	○	●	●	●	●	●	●	●
Context Sensitive Help	●	○	●	●	●	●	●	●	●
User Questions Answered Online	●	○	●	●	●	●	●	●	●
Telephone Access To Technical Support	●	○	●	●	●	●	●	●	●
On Site Training Available	●	○	●	●	●	●	●	●	●
Binary File Transfer Capability		○		● via kermit	●	● via kermit	●	●	●
3270 Support		*	●						

ELECTRONIC MAIL/OS FEATURES

FEATURES	NJIT EIES 1	NJIT EIES 2	NETI PARTICIPATE	DEC VAX NOTES	ADVERTEL CONFER	DC META CAUCUS	INFOMEDIA NOTEPAD	Public Service Mail & Conferencing: ITT DIALCOM	Public Service Mail & Conferencing: STC THE SOURCE
Hardware	Perkin Elmer	IBM or VAX or 3 B Ser	IBM, DEC Prime	Micro Vax and "VAXEN"	IBM 370 Architechture	PC AT, VAX Prime, IBM	DEC 20	50 Series Prime	50 Series Prime
Operating System (Unix, VM, MVS, VMS)	Proprietary	Unix or VM	VM, VMS, & Primos	VMS	Proprietary (MTS)	Xenix, Unix Primos, VM, VMS	Proprietary	Proprietary (Primos)	Proprietary (Primos)
Automatic Confirmation of Message Receipt	●	○						●	
Blind Carbon Capability	●	○		●	●	●		●	●
Messages Tagged by Author, Time, & Subject	●	○	●	●	●	●	●	●	●
Messages Tagged by Length	●	○	●	●			●	●	●
Mail Addressed by Priority		*	●	●				●	●
Mail Always Deletable by Author	●	○	●	● mail no cc's yes		● mail no cc's yes	●	●	
Mail Always Editable by Author	●	○	●	● mail no cc's yes		● mail no cc's yes	●	●	●
Author Notified When Message Forwarded		*							
May Review Waiting Mail Via Keywords		*			●				
May Send Reply to Mail Item & All Its Addresses	●	○	●	●					
Screen Window to View Message While Answering		*		●					
May Send or Receive Mail Via Pen Name	●	○	●	○	●		●		●
May Attach an Opinion to a Message		*							
Tickler File	●	*	●	via pd ● vms software	●		●	●	

CONFERENCING SYSTEMS

FEATURES	NJIT EIES 1	NJIT EIES 2	NETI PARTICIPATE	DEC VAX NOTES	ADVERTEL CONFER	DC META CAUCUS	INFOMEDIA NOTEPAD	Public Service Mail & Conferencing: ITT DIALCOM	Public Service Mail & Conferencing: STC
Hardware	Perkin Elmer	IBM or VAX or 3 B Ser	IBM, DEC Prime	Micro Vax and "VAXEN"	IBM 370 Architechture	PC AT, VAX Prime, IBM	DEC 20	50 Series Prime	THE SOURC 50 Series Prime
Operating System (Unix, VM, MVS, VMS)	Proprietary	Unix or VM	VM, VMS, & Primos	VMS	Proprietary (MTS)	Xenix, Unix, Primos, VM, VMS	Proprietary	Proprietary (Primos)	Proprietary (Primos)
Calendaring & Scheduling		*		Via All In One					
Data Base Interface		O		Via All In One	●			●	●
Forms Available and Data Base Processable		O		Via All In One	●			●	●
Forms Are User Creatable		O		Via All In One	●			●	●
Forms May Be Sent to Multible Users for Actions		*		Via All In One					
Profs Interface						via desnet O			
User Privileges Transferable to Surrogate	●	*	●	●	●		●	●	
User May Define Own Comments	●	O	●	●	●			●	●
User May Answer Ahead	●	O	●	via user defined access ●	●		●	●	●
Command to Attach Existing Item to New Item	●	O	●	●			●	●	●
System Builds Individual Indexes of User Activity		*							
Waiting Communications Status Menu (Index)		*	●	●	●	●	●	●	
Information Overload "Plus Read" Filter	●	O		●	●				

CONFERENCING (cont'd)								Public Service Mail & Conferencing	
FEATURES	NJIT EIES 1	NJIT EIES 2	NETI PARTICIPATE	DEC VAX NOTES	ADVERTEL CONFER	DC META CAUCUS	INFOMEDIA NOTEPAD	ITT DIALCOM	STC THE SOURCE
Hardware	Perkin Elmer	IBM or VAX or 3 B Ser	IBM, DEC Prime	Micro Vax and "VAXEN"	IBM 370 Architechture	PC AT, VAX Prime, IBM	DEC 20	50 Series Prime	50 Series Prime
Operating System (Unix, VM, MVS, VMS)	Proprietary	Unix or VM	VM, VMS, & Primos	VMS	Proprietary (MTS)	Xenix, Unix, Primos, VM, VMS	Proprietary	Proprietary (Primos)	Proprietary (Primos)
Searchable for Authors	●	○	●	●	●	●	●	●	●
Searcheable by Time Range	●	○	●	●			●		●
Searcheable by Keyword	●	○		●	●	●		●	
Voting	●	*	●		●		●		●
Time Linear Structure	●	○	●				●		●
Two Dimensional Time Linear Structure		○		●	●	●		●	
Branching		○	●						●
Moderator May Assign Creation of Items		*							
User Established Profile for Selective Retrieval		○		●					

CONFERENCING								Public Service Mail & Conferencing	
FEATURES	NJIT EIES 1	NJIT EIES 2	NETI PARTICIPATE	DEC VAX NOTES	ADVERTEL CONFER	DC META CAUCUS	INFOMEDIA NOTEPAD	ITT DIALCOM	STC THE SOURCE
Hardware	Perkin Elmer	IBM or VAX or 3 B Ser	IBM, DEC Prime	Micro Vax and "VAXEN"	IBM 370 Architechture	PC AT, VAX Prime, IBM	DEC 20	50 Series Prime	50 Series Prime
Operating System (Unix, VM, MVS, VMS)	Proprietary	Unix or VM	VM, VMS, & Primos	VMS	Proprietary (MTS)	Xenix, Unix, Primos, VM, VMS	Proprietary	Proprietary (Primos)	Proprietary (Primos)
Definable as Public or Private	●	○	●	●	●	●	●	●	●
Moderator with Editorial & Conferencing Access control	●	○	●	●	●	●	●	●	●
Membership List	●	○	●	●	●	●	●	●	●
Membership List Shows Items Read	●	○	●	●	●	●	●	●	●
Comments May Be Tagged With Link to Earlier Item	●	○		●			●		
Comments Tagged With Keyword	●	○		●	●	●		●	
Assistance in Maintenance of Keyword Uniformity		*		●					
Automatic Delivery of New Items	●	○	●	●	●	●	●	●	●

Addresses for Vendors of Conferencing Software

Caucus:

Metasystems Design Group
2000 North 15th St., Suite 103
Arlington, VA 22201
(703)243-6622

COM/PortaCOM:

Stockholm University Computing Center
Box 27322
S-102 54 Stockholm, Sweden

CONFER II:

Advertel Communication Systems, Inc.
2067 Ascot
Ann Arbor, Michigan 48103
(313)665-2612

CoSy:

Computing Support Services
University of Guelph
Guelph, Ontario N1G 2W1
CANADA
(519)824-4120

or

Softwords
4252 Commerce Circle
Victoria, British Columbia
CANADA V8Z 4M2
(604)727-6522

EIES 2, TEIES, Personal TEIES:

Computerized Conferencing and Communications Center
New Jersey Institute of Technology
323 High Street
Newark, New Jersey 07102
(201)596-3437

NotesFile:

NotesFile Reference Manual
Department of Computer Science
University of Illinois at Urbana0Champaign
1304 W. Springfield Avenue
Urbana, Illinois 61801

NOTEPAD:

InfoMEDIA Corp.
801 Traeger Avenue, Suite 275
San Bruno, California 94066

PARTICIPATE (Parti):

Eventures Limited
2744 Washington St.
Allentown, PA 18104
(215)770-0650

** Jutland Open University (Denmark) has entered into a contractual arrangement with IBM - Denmark to participate in the development and testing of a new conferencing software designed for use in distance study (Lorentsen et al., 1989).

For additional information, see:

Feasley, C. E. (1989). Groupware gains momentum. American Journal of Distance Education, 3(2), 82-84.

Hughes, C., Cook, G., & McGrath, J. (1987). A survey of computer mediated communications: Computer conferencing comes of age. (Available from The Gartner Group, 56 Top Gallant Road, P. O. Box 10212, Stamford, CT, 06904).

Lorentsen, A., Laursen, E., Rasmussen, P., Dirckinck-Holmfeld, L., Kolmos, A., Christensen, B. B., & Olsen, J. B. (1989). Technology & New Pedagogy in Open Learning (TNP). (Available from TNP, Institute 12, Department of Languages and Intercultural Studies, Aalborg University Centre, P. O. Box 159, DK - 9100, Aalborg, Denmark.

Meeks, B. N. (1985, December). An overview of conferencing systems. Byte, pp. 169-184.

Reference Information for Distance Education and CMC

International List of Distance Education Publications

*

Material reprinted by permission from Eugene Rubin, editor of Research in Distance Education. The list originally appeared in Research in Distance Education, July, 1989, 1(2),pp. 16-19.

Publications which are devoted to the theme of distance education:

a distanza: Periodico della Scuola per Correspondenza Accademia, Accademia s.p.a., bia G.V. Englen 25, 1-00163, Roma, Italy.

Accademia: Newsletter mensile, di "adistanza", Accademia s.p.a., bia G.V. Englen 25, 1-00163 Roma, Italy.

American Journal of Distance Education, College of Education, Rackley Building, The Pennsylvania State University, University Park, PA 16802 USA.

AADEP Newsletter (Australasian Association of Distance Education Principals), Mrs. Carlotta Green, NT Secondary Correspondence School, P.O. Box 40471, Casuarina, Northern Territory 0810, Australia.

APPRENDE: Le Magazine de Centre National D'Enseignement a Distance, CNED, 209-211 rue de Bercy, 75585 Paris Cedex 12, France.

Asociacion Argentina de Educacion a Distancia Carta Informativa, AAED Callao 569, 2p., Of. 19, 1022 Buenos Aires, Argentina.

Asociacion Iberoamericana de Educacion Superior a Distancia Boletin, Informativo, AIESAD, Apartado de Correos 50487, Madrid, Spain.

ASPESA News (Newsletter of the Australian and South Pacific External Studies Association), Editor, David Meacham, Head, Distance Education Resource Centre, Mitchel College of Advanced Education, Bathurst, NSW 2795, Australia.

ASPESA Papers, Editor, David Meacham, Head, Distance Education Resource Centre, Mitchel College of Advanced Education, Bathurst, NSW 2795, Australia.

Communique, Canadian Association for Distance Education, 151 Slater, Ottawa, Ontario, K1P 5N1, Canada.

DEANZ (Distance Education Association of New Zealand) ***Bulletin,*** Judy Southworth, Editor, DEANZ Bulletin, New Zealand Correspondence School, Private Bag, Wellington, New Zealand.

Distance Education, Darling Downs Institute Press, Toowoomba, Queensland 4350, Australia.

Distance Education and Training Network Newsletter, Bob Spencer, Centre for Distance Education, Athabasca University, Box 10,000, Athabasca, AB, TOG 2R0, Canada.

Distance Education Providers: K-12, Applied Business TeleCommunications, Box 5106, San Ramon, California, 94583 USA.

Distance Education: News and Views, B.C. Marumo, AADE Treasurer, Dept. of Non-Formal Education, Ministry of Education, P.M.B. 0043, Gaborone, Botswana.

Educacion a Distancia: Revista Trimestral de los Centros apec de Educacion a Distancia, Centros APEC de Educacion Distancia, Apartado Postal 1497, Santo Domingo, Dominican Republic.

EKALAVYA, Ravi Mohan, Prof., Indira Gandhi Open University, K-76 Hauz Khas, New Delhi, India.

EPISTOLODIDAKTIKA, The European Journal of Distance Education. NKI - skolen, Box 10, N-1321 Stabekk, Norway.

ICDE Bulletin, Open University, Regional Academic Services, Walton Hall, Milton Keynes, MK7 6AA UK.

ICDE Women's International Network Newsletter, Liz Burge, Instructional Resources Development Unit, Ontario Institute for Studies in Education, 252 Bloor St., Toronto, Ontario, M5S 1V6 Canada.

Indian Journal of Distance Education, Chief Editor, Prof. S. Bhatnagar, Director, Directorate of Correspondence Courses, Punjab University, Chandigarh, India.

Journal of Distance Education, CADE Secretariat, 151 Slater Street, Ottawa, Ontario, K1P 5N2 Canada.

Never Too Far: A Newsletter for Distance Education, Sukhothai Thammathirat Open University, Pakkred, Nonthaburi 11120 Thailand.

NHSC News, National Home Study Council, 1601 18th St. NW Washington DC, 20009, USA.

OLS News, (The Independent Voice of Open Learning), Anna Nichols, NCET, 10 Metuchen Way, Hedge End, Southampton, SO3 4JZ, UK.

Online Journal of Distance Education and Communication, Olson Ohler, Editor, Educational Technology Program Director, University of Alaska Southeast, 11120 Glacier Highway, Juneau, Alaska 99801, USA.

Open Campus, Institute of Distance Education, Deakin University, Victoria 3217, Australia.

Open Learning, Longman Group UK Ltd., Subscriptions Dept., Fourth Avenue, Harlow, Essex CM19 5AA UK.

Open University of Sri Lanka Newsletter, The Editoral Board, Newsletter, The Open University, Nawala, Nugegoda, Sri Lanka.

Pakistan Journal of Distance Education, Dr. Ahmed Noor Khan, Research and Statistical Centre, Allama Iqbal Open University, Sector H-8 Islamabad, Pakistan.

Per Distans: Nyhetsblad for Svenska Riksorganisationen for Distansundervisning, Per Eklund, Umea University, S-901 87 Umea, Sweden.

Research in Distance Education, Centre for Distance Education, Athabasca University, Box 10,000, Athabasca, Alberta TOG 2R0 Canada.

Sinal: Revista do Projecto Universidade Abierta, Palacio Ceia, Rua da Escola Politecnica 147, 1200 Lisbon, Portugal.

Spotlight: The Quarterly Magazine on Open and Flexible Learning, The Training Agency, Moorfoot, Sheffield, S1 4PQ, UK.

Publications which will accept an article directly related to distance education:

Adult Learning and Library News, Library Association, 7 Ridgmount St. London, WC1E 7AE, UK.

Adult Education, National Institute of Adult Continuing Educ., 19B De Montfort St., Leicester, LE1 7GE, UK.

Adult Education in Finland, Editor, Kansanvalistusseura, Museokatu 18 A2, 00100 Helsinki 10, Finland.

American Educational Research Journal, AERA, 1230 17th St. N.W. Washington, DC 20036 USA.

American Independent Study, AIS, Brigham Young University, 206 Harman Building, Provo, Utah 84602, USA.

AONTAS Newsletter, AONTAS, 65 Fitzwilliam Square, Dublin 2, Republic of Ireland.

British Educational Research Journal, Carfax Pub. Co. Box 25, Abingdon, Oxfordshire OX14 3UE UK.

British Journal of Educational Technology, CET, 3 Devonshire St., London W1N 2BA England.

Canadian Journal of Educational Communication, AMTEC, 500 Victoria Rd., North Guelph, Ontario N1E 6K2 Canada.

Boletin De Informatica Educativa, Projecto 511E, Apartado Aereo 4976 of. W309, Bogota, Colombia.

British Journal of Guidance and Counselling, Hobsons Pub., Bateman St. Cambridge, CB2 1LZ UK.

Bulletin of the International Bureau of Education, (subscription details from local UNESCO distributors).

Canadian Journal of Higher Education, Canadian Society for the Study of Higher Education, c/o Faculty of Education, University of Manitoba, Winnipeg, Manitoba R3T 2N2 Canada.

Canadian Journal of Education, Canadian Society for the Study of Education, c/o Tim Howard, 14 Henderson Ave., Ottawa, Ontario K1N 7P1, Canada.

Carta de Technologia Educativa, Instituto Colombiano para el Fomento de la Educacion Superior, Apartado Aereo 6319, Bogota, Colombia.

CET News, Council for Educational Technology of the United Kingdom, 3 Devonshire St. London, W1N 2BA, UK.

Development Communication Report, Clearinghouse on Development Communication, 1815 North Ft. Meyer Drive, 6th floor, Arlington, Virginia 22209, USA.

Directions 16, The Director, Institute of Education, University of the South Pacific, P.O. Box 1168, Suva, Fiji.

EDUCA: The Digest for Vocational Education and Training, Robin Twining, Guildford Educational Services Ltd., 32 Castle Street, Guildford, Surrey, GU1 3UW, UK.

Educationa: Media International: The Official Quarterly Journal of the International Council for Educational Media, ICEM/CIME Secretariat, c/o R. Lefranc, 29 rue d'Ulm, 75230 Paris, Cedex 05, France.

Educational Media Newsletter, Information, Documentation & CFL Division, Central Institute of Educational Technology, 10-B Ring Road, I.P. Estate, New Delhi 110002, India.

Educational Technology, Educational Technology Publications, Inc., 720 Palisades Ave. Englewood Cliffs, N.J. 07632, USA.

Educational Technology Newsletter, Division of External and Continuing Education. Darling Downs Institute of Advanced Education. P.O. Darling Heights, Toowoomba, Queensland 4350, Australia.

Erasmus Newsletter, Office for Official Publications of the European Communities, L-2985 Luxembourg.

HBF Newsletter, Hoso Bunka Foundation, Kyodo Building, 41-1 Udagawa-cho, Shibuya, ku, Tokyo 150, Japan.

Higher Education, Kluwer Academic Publishers Group, P.O. Box 989, 3000 AZ, Dordrecht, Netherlands.

Higher Education in Europe, European Centre for Higher Education, 39 Stirbei Voda Street, R-70732 Bucharest, Romania.

Innovative Higher Education, Human Sciences Press, Inc. N.Y. 72 Fifth Ave., New York, NY 10011 USA.

Instructional Science: An International Journal, Kluwer Academic Publishers Group, P.O. Box 989, 3300 AZ Dordrecht, Netherlands.

Intermedia, Intern'l Inst. of Communications, Tavistock House South, Tavistock Square, London, WC1H 9LF, UK.

International Journal of Innovative Higher Education, Secretariat, University Without Walls. International Council, Suite 820, Renaissance Plaza, 150 Bloor St. W., Toronto, Ontario, M5S 2X9 Canada.

International Review of Education, Kluwer Academic Publishers Group, P.O. Box 322, 3300 AH Dordrecht, Netherlands.

Journal of Educational Research, Heldref Pub., 4000 Albermarle St. NW, Washington, DC 20016 USA.

Journal of Educational Technology Systems, Dr. Farhad Saba, Department of Educational Technology, College of Education, San Diego State University, San Diego, CA 92182, USA.

Journal of Educational Television. Carfax Publishing Co., P.O. Box 25, Abingdon, Oxfordshire, OX14 3UE, UK.

La Educacion: Revista Interamericana Desarrollo Educativo, Departamento de Asunto Educativos, Organizacion de los Estados Americanos, Washington, DC 20006, USA.

Lifelong Learning:, 1112-16 St. N.W., Ste. 420, Washington DC, 20036 USA.

Media in Education and Development, Taylor & Francis Ltd., 4 John Street, London, WC1N 2ET, UK.

National Home Study Council Bulletin, National Home Study Council, 1601 18th St. NW Washington DC, 20009, USA.

NCET News (National Council for Educational Technology), 3 Devonshire Street, London, W1N 2BA, UK.

NIACE Newsletter (National Institute of Adult Continuing Education), 19B De Montfort St. Leicester, LE1 7GE, UK.

NORRAG News (Northern Research Advisory Group), Christine McNab, Institute of International Education, University of Stockholm, S-106 91 Stockholm, Sweden.

Programmed Learning and Educational Technology, Kogan Page Ltd. 120 Pentonville Road., London N1 9JN, UK.

Prospects: Quarterly Review of Education, (subscription details from local UNESCO distributors).

Researches in Adult Higher Education, Zhou Jianshu, Correspondence College, People's University, Haidian Rd. Beijing, China.

Review of Educational Research, AERA, 1230 17 St. NW, Washington, DC 20036 USA.

Revista Cubana de Educacion Superior, Dpto de Seleccion y Adquisicion, Seccion de Seleccion y Canje, Universidad de La Habana, Ciudad de La Habana 4, Cuba.

Revista de Technologia Educativa, Centro de Perfeccionamiento, Experimentacion e Investigaciones Pedagogicas, Ministerio de Educacion Publica, Casilla 16162, Correo 9, Santiago, Chile.

Technologia Educacional, Associacao Brasileira de Technologia Educacional, R. Jornalista, Orlando Dantas 56, Botafogo, Rio de Janeiro, Brazil.

Una Opinion, Universidad Nacional Abierta, Avenida Gamboa no. 18, San Bernardino, Caracas 1010, Venezuela.

International Clearinghouses for Distance Education Resources

Open University

The Center for Information Technology in Education at the Open University maintains a record of work conducted by members of the Institute of Educational Technology.

Many of the materials are available in books, journals, ERIC, and so on. However, any published or unpublished work may also be ordered directly from the Center for a charge, including postage. It is advisable to consult sources like ERIC prior to ordering directly from the OU, because costs of photocopying (not a non-profit service) and postage from the U.K. can make the latter process a costly one.

To order specific material or to request The Institute Bibliography (the cumulative list), contact:

Don Whitehead
Institute of Educational Technology
The Open University
Walton Hall
Milton Keynes MK7 6AA

* It is also possible to get on the accessions mailing list, which lists new publications in every area of distance education from every part of the globe, as well as conferences and meetings. In addition, the IET solicits bibliographic information on recent publications within the field of distance education, including conference papers and internal reports.

In addition to the Institute of Educational Technology, the OU is also host to the International Centre for Distance Learning, which is a clearinghouse for distance education publications from around the world. This information is divided into two categories: a) prospectuses of distance teaching institutions, books, reports, conference papers, and unpublished material, and b) extensive information on the institutions, including subjects taught, media used, entry requirements, and POC's.

For information, write:

Dr. Keith Harry
United Nations University
International Centre for Distance Learning
The Open University
Walton Hall
Milton Keynes, MK7 6AA
United Kingdom

The German Institute for Distance Studies

The DIFF, at the University of Tübingen, has various publications, study materials, and research reports available for purchase.

For more information, contact:

The German Institute for Distance Studies
University of Tübingen
Wöhrdstrasse 8
D-7400 Tübingen 1, West Germany

The FernUniversität

The FernUniversität is one of the leading distance teaching universities in the world, particularly in terms of its research and systems evaluations. It is also a clearinghouse for information about distance education.

For more information, write:

The FernUniversitat
Gesamthochschule
(The ZIFF)
Postfach 9 40
D-5800 Hagen, West Germany

International Council for Distance Education (ICDE)

Founded in 1938, the ICDE is the coordinating body for international distance education. Membership consists of individuals and institutions from 60 countries. It promotes cooperative research, information-sharing, and development among member countries.

For more information, write,
Secretary General
International Council for Distance Education
P.O. Box 2100
Grünerløkka
N-0505 Oslo 5, Norway

Australian Open Learning Information Network (AOLIN)

The AOLIN was founded in 1986 as an electronic meeting place for educators interested in information technologies. Membership now consists of 120 educators from 45 countries.

For more information,
If writing from North America, contact:
Dr. Roger Boshier
University of British Columbia
5760 Toronto Road
Vancouver, B.C. V6T 1L2
Canada

If writing from Europe, contact:

Dr. Paul Bacsich or Dr. Keith Harry
Open University
Milton Keynes, MK7 6AA
United Kingdom

Asian Mass Communication Research and Information Centre (AMIC)

Founded in 1971, AMIC began as a clearinghouse for information on mass communication in the Asian-Pacific area.

For more information, contact:
Asian Mass Communication Research and Information Centre
39 Newton Road
Singapore 1130
Republic of Singapore

References

Castro, A. (1987). Introducing AOLIN, Australian Open Learning Information Network. Journal of Distance Education, 2(2), 65-68.

Mehra, A., & Menon, V. (1987). Training needs in the use of media for distance education in Asia. Journal of Distance Education, 2(2), 69-72.

Selected Bibliography of CMC and Distance Education

This section is divided into three parts:

1) CMC, Computers, and Teleconferencing
2) Distance Education
3) Related Background Literature (including Adult Education, for example)

The references in this list were accumulated as an ongoing part of the research on the use of CMC for distance education. While most of these references were obtained by traditional means, many of them were acquired by writing personal letters to some of the contributing authors to Learning at a Distance: A World Perspective.[1] This book is not only a source of many fine articles, but also contains an appendix that lists biographical information, institutional affiliation, and addresses of the 129 international contributors.

In terms of the recent literature on CMC, two sources deserve special mention. Mindweave[2] and Online Education[3] are two excellent resources that provide a comprehensive view of current applications and issues.

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[1]Daniel, J. S., Stroud, M. A., & Thompson, J. R. (Eds.) (1982). Learning at a distance: A world perspective. Edmonton: Athabasca University/International Council for Correspondence Education.

[2]Mason, R., & Kaye, A. (Eds.) (1989). Mindweave: Communication, computers, and distance education. Oxford: Pergamon Press.

[3]Harasim, L. (Ed.) (1990). Online education: Perspectives on a new domain. New York: Praeger.

CMC, Computers, and Teleconferencing

Aircraft Armaments, Inc. (1963). Teleconferencing: An experimental task (Contract No. SD-50, IDA Research Paper P-112). Washington, DC: Institute for Defense Analysis, Research and Engineering Support Division.

Alexander, G. (1986). The thought box and the scholar's network: Computer-based tools for distributed learning. Unpublished manuscript, Open University, Milton Keynes, UK.

Anderson, J. (1987). Computer-assisted language learning. Prospects, 17(3), 417-429.

Atack, C. (1988, January). Seven million pound plan to create an electronic university. Educational Computing, p. 5.

Atack, L. (1988, March). Learning by computer. The Canadian Nurse, pp. 24-26.

Bacsich, P. (1987). Computer conferencing in distance education. In A. Jones, E. Scanlon, & T. O'Shea (Eds), The computer revolution in education: New technologies for distance teaching (pp. 101-114). New York: St. Martin's Press.

Bacsich, P., Kaye, A., & Lefrere, P. (1986). New information technologies for education: A brief survey. In P. I. Zorkoczy (Ed.), Oxford surveys in information technology (Vol. 3) (pp. 271-318). Milton Keynes: Oxford University Press.

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Balson, D., Drysdale, R., & Stanley, B. (1981). Computer-based conferencing systems for developing countries. Ottawa: International Development Research Centre and the International Federation for Information Processing.

Bamford, H. E. (1980, September). Computer conferencing: The exchange of experience. IPC Business Press, pp. 215-220.

Bannon, L. J. (1986). Computer-mediated communication. In D. A. Norman & S. W. Draper (Eds.), User-centered system design: New perspectives on human-computer interaction (pp. 433-512). Hillsdale, NJ: Lawrence Erlbaum Associates.

Barker, L. J., White, V. J., & Taylor, J. C. (1985). Computer-managed learning in tertiary education: An organisational development perspective. Australian Journal of Adult Education, 25(1), 23-30.

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Bavelas, A., Belden, T. G., Glenn, E. S., Orlansky, J., Schwartz, J. W., & Sinaiko, H. W. (1963). Teleconferencing: Summary of a preliminary research project (Study S-138, Contract SD-50). Washington, DC: Institute for Defense Analysis.

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Bolt, R. A. (1985, February/March). Conversing with computers. Technology Review, pp. 35-43.

Boshier, R. (1988, May). Socio-psychological factors in electronic networking. Paper presented at the annual conference of the Canadian Association for the Study of Adult Education, Calgary, Alberta.

Boyd, G. M. (1987). Emancipative educational technology. Canadian Journal of Educational Communication, 16(2), 1-7.

Boyd, G. M. (1987). Flexible learning through computer-mediated communications: Opportunities and limitations. In F. Percival, D. Craig, & D. Buglass (Ed.), Flexible learning systems. (pp. 150-155). London: Kogan Page.

Bramer, M. (1980). Using computers in distance education: The first ten years of the British Open University. Computers and Education 4, 293-301.

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Brown, E., & Sullivan J. (1985). Electronic conferencing and faculty/student contact time. In K. Duncan & D. Harris (Eds.), Computers in education (pp. 503-507). Amsterdam: North-Holland.

Brown, J. S. (1985). Process versus product: A perspective on tools for communal and informal electronic learning. Journal of Educational Computing Research 1(2), 179-201.

Brown, J. W. (1986, April). Some motivational issues in computer-based instruction. Educational Technology, pp. 27-29.

Burpee, P., Wilson, B. & Aumndsen, C. (1988). Electronic mail in distance education: A Canadian perspective. Unpublished manuscript, McGill University, Montreal.

Canelos, J., & Carney, B. W. (1986, February). How computer-based instruction affects learning. Engineering Education, pp. 298-301.

Carnegie Mellon University, Committee on Social Science Research in Computing. (1985). Research on social aspects of computing at Carnegie Mellon University. Pittsburgh: Carnegie Mellon.

Carr, R. (1988). Computer conferencing and the university community. Open Learning, 3(2), 37-40.

Castro, A. (1988). The "openess" of computer-mediated communication systems in distance teaching. Unpublished manuscript, Institute of Educational Technology, The Open University, Milton Keynes, United Kingdom.

Chapanis, A. (1976). Human factors in teleconferencing systems (Grant No. APR-7518622 for the National Science Foundation). Baltimore: The Johns Hopkins University, Dept. of Psychology.

Clark, R. E. (1984). Research on student thought processes during computer-based instruction. Journal of Instructional Development, 7(3), 2-6.

Cohen, M., & Miyake, N. (1986). A worldwide intercultural network: Exploring electronic messaging for instruction. Instructional Science 15, 257-273.

Cohen, M., & Riel, M. (1988). The effect of distant audiences on students' writing. Manuscript submitted for publication.

Cohen, V. B. (1985, January). A reexamination of feedback in computer-based instruction: Implications for instructional design. Educational Technology, pp. 33-37.

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SUMMARY

The purposes of this report were to provide Army instructors and designers with (1) a practical review of the findings regarding successful implementation of CMC for distance education; (2) a reference guide which integrates a wide range of international resources that will be of use to both researchers and practitioners. This section is divided into two parts, summaries of the literature review and of the international resources.

Part One:

Summary of the Literature Review on Distance Education

Factors Relevant to an Instructor in Distance Education

Student Factors

1. Female students are less likely to drop out than male students.

2. Students with more educational experience are more likely to complete a course.

3. Computer conferencing involves many, sometimes radical changes in communication patterns, because of its many differences from a face-to-face environment. New users should be provided with some form of orientation to CMC in order to facilitate an efficient start and effective progress.

Instructor Responsibilities

1. Because of the high dropout rate in distance compared to face-to-face education, the instructor plays more of a facilitative and motivational role, rather than merely a disseminator of information and record-keeper of student progress. One of the most critical components in facilitating course completion is to maintain a personal friendly relationship with students.

2. Student contact with an instructor is one of the most significant factors in facilitating both completion and performance.

3. Many distance education institutions provide their instructors with special training, both to sensitize instructors to the special needs of distance students as well as the ways in which the instructor role differs from the traditional face-to-face environment.

4. Feedback may be an even more important issue for distance than residence students, because of factors like geographic and social isolation.

Because of CMC, instructors can often provide students with feedback on assignments within 24 hours. However, in order to encourage a lively discussion among students, it may often be advisable for an instructor to delay feedback on discussion comments.

5. Interaction with other students typically has a favorable impact on both completion rates and performance. Many educators advise that group work may be the single most important consideration in implementing CMC for distance education.

Factors Relevant to an Instructional Designer in Distance Education

Student Factors

1. Available research suggests that students do not always use materials in the ways recommended by the course designer. Additional research also suggests that not only is there often a wide range of reported study times among students in the same course, but that many students study less time than the institution advises.

   Designers can exercise some control both by creating course materials that require depth of processing and by providing students with information on study skills.

2. Available research has shown that successful participation in a CMC class is strongly impacted by convenient access to a computer, typically in the home or at work. Institutions are exploring various means to insure access, either by supplying students with computers or encouraging/requiring them to purchase their own.

3. There are strong indications that rate of assignment submission can be a valid predictor of course completion.

   In terms of dropout, perhaps the most critical period of the course is up to the one third to halfway point. Designers should consider making the first assignment short to encourage a quick start, providing many short assignments rather than a few lengthy ones, and requesting instructors to maintain a high level of feedback.

Instructional Design Issues

1. In drafting or revising distance materials, the following problems are frequently observed:

   a. The first unit of a course may be too long or even more difficult than later units.

b. Study guides may be more difficult than the text they are designed to explain.

c. As courses are revised, they are often expanded to the point that students are required to do considerably more work for the same amount of credit.

2. While the range of CMC implementations is still rather small, CMC seems particularly effective for courses with considerable pragmatic content, topics which invite discussion rather than rote memorization, and courses which do not place an undue reliance on manipulation of actual physical objects or mathematical symbols.

3. One of the most robust findings is the distance education literature is that a variety of media is important in facilitating course completion.

4. When incorporating CMC into an already existing distance course, it is of critical importance to thoroughly integrate CMC. If participation is voluntary, CMC will be under-utilized.

5. Completion rates are generally higher when the instructor sets the pace and schedule than when the student self-paces.

6. There is no conclusive evidence that a successful CMC class is dependent upon any face-to-face meetings.

Part Two:
Summary of International Resources in CMC and Distance Education

Selected List of Distance Teaching Institutions and Organizations is a list of institutions and multi-national organizations involved in distance education. The purpose of this resource was to show both the number and range of industrialized and third world countries involved in distance study.

Distance Education and Graduate Study contains brief descriptions of institutions offering either graduate study at a distance or graduate study in the subject area of distance education.

Implementations of Computer-mediated Communications contains:

a) A chart of educational applications
b) A chart of communication applications
c) Annotations, providing additional information where available

Information on Computer Conferencing Software contains:

a) A chart providing a comparative description of the major computer conferencing systems
b) Contact information, including telephone numbers, for the vendors of the major conferencing systems

Reference Information for CMC and Distance Education contains:

a) An International List of Distance Education Journals (the names and addresses of international publications that are either devoted exclusively to the area of distance education or that will accept articles directly related to distance study)

b) International Clearinghouses for Distance Education Resources (a description of and addresses for some of the major international documentation centers for distance education, including those in the United Kingdom, Norway, Australia, and West Germany)

c) Selected Bibliography (references in distance education, computer-mediated communication, information technology, media selection, and adult education)